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Telephony

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ELECTRONICS SECTION—Page 31

PRISON OPERATORS

This 40-foot concrete tower in front of Kilby Prison, near Montgomery, Ala., houses the two best-protected telephone operators in the state—Mildred Best and Mary Butler. A quarter-inch of steel armor shields the lower section. See story on page 44.

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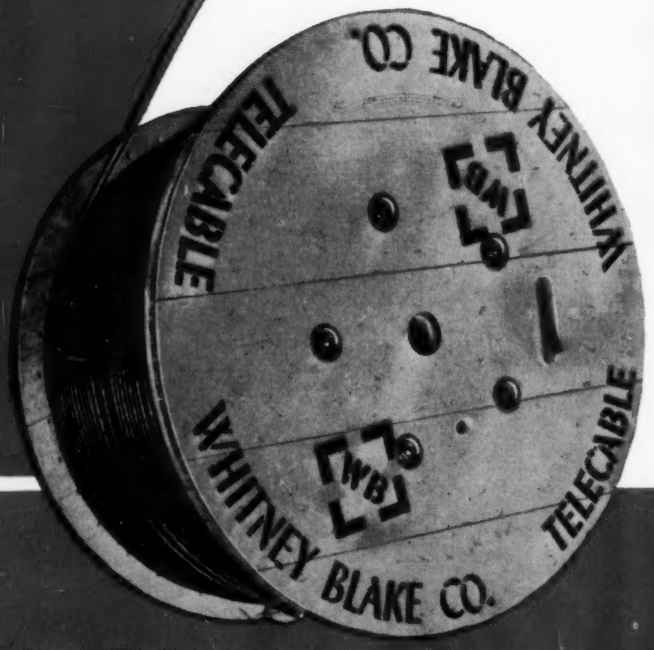

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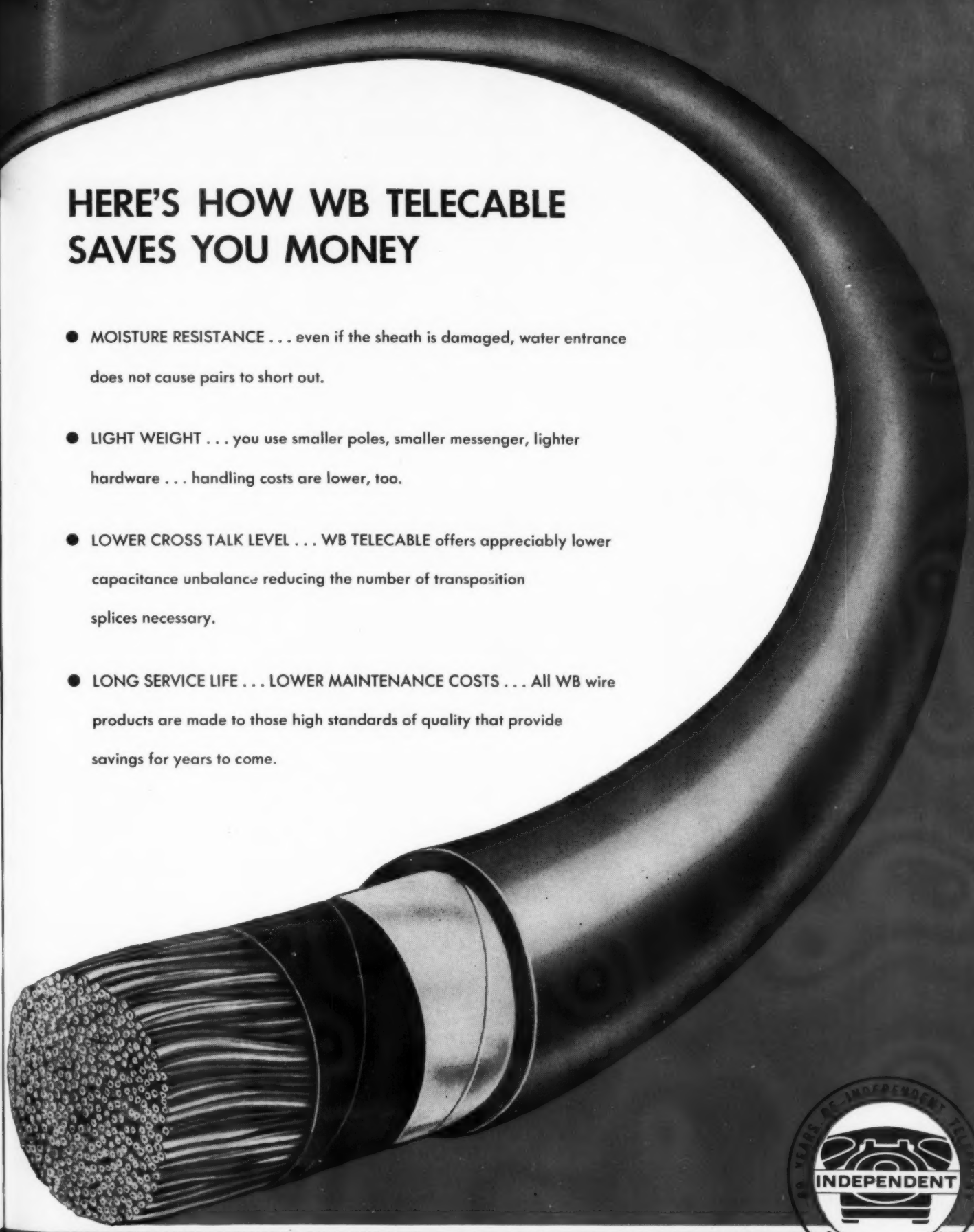

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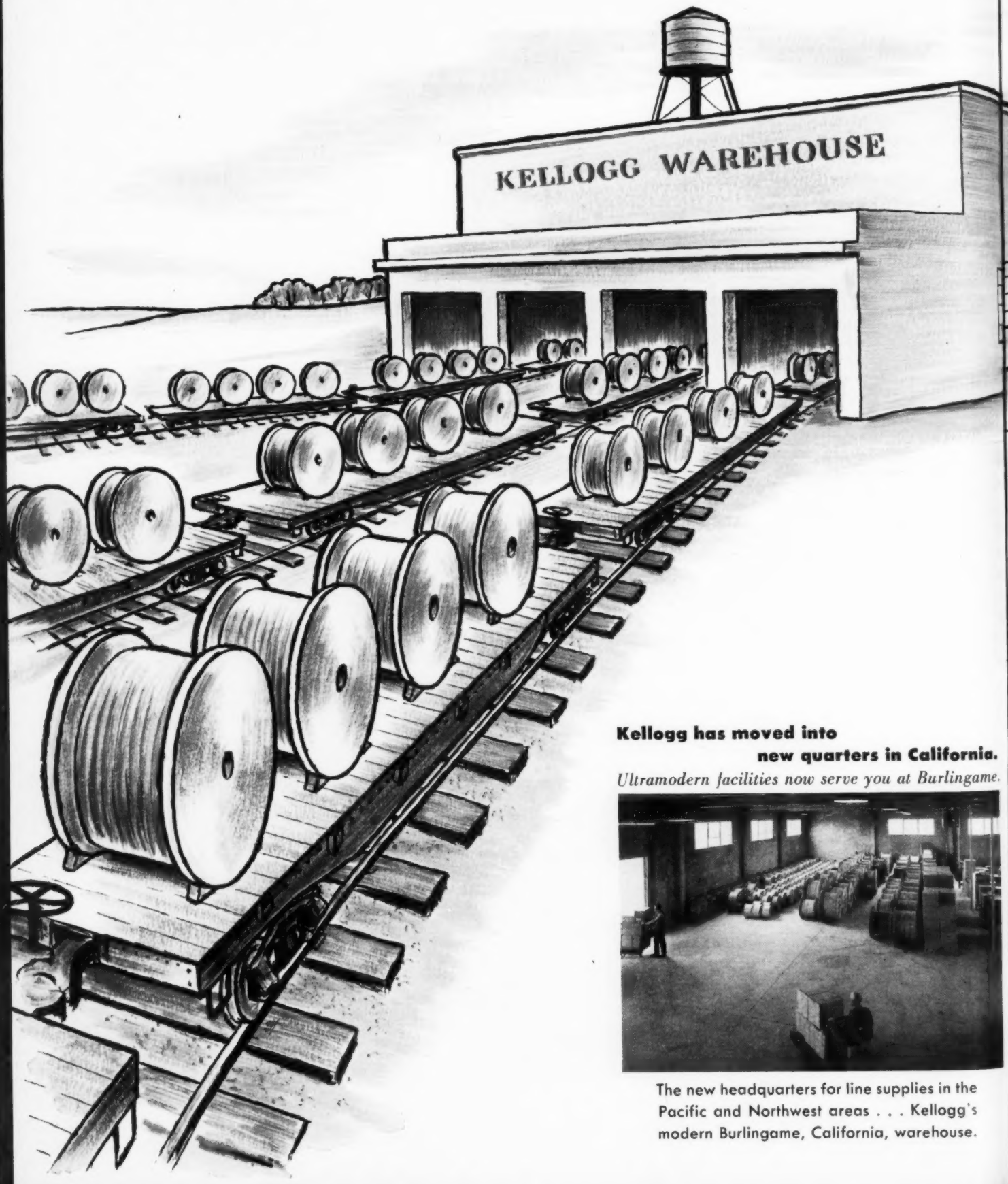

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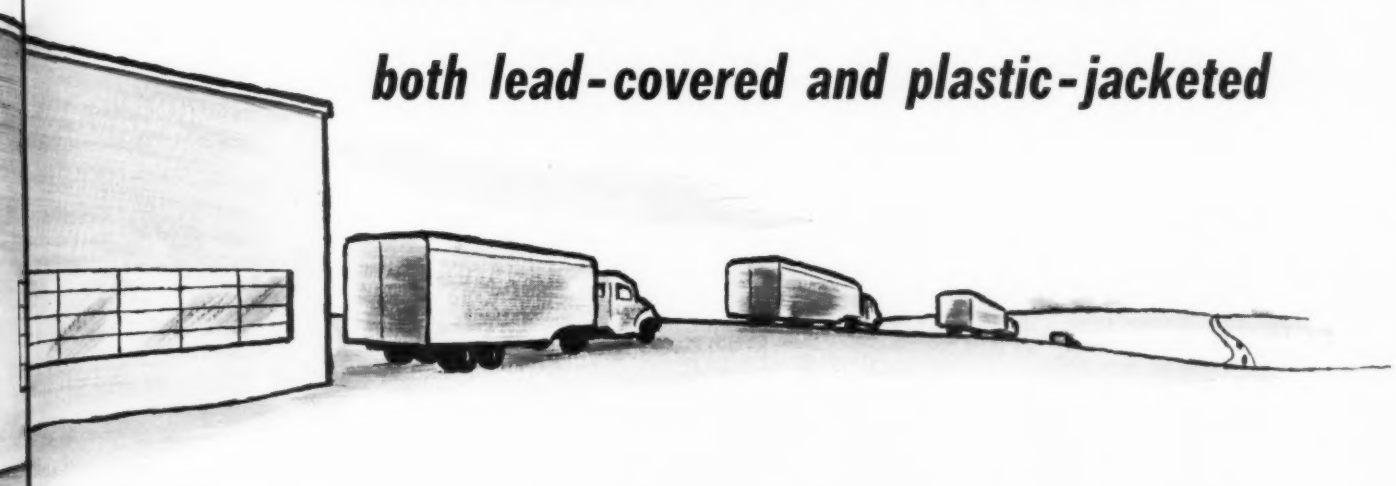

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FLASHES AND PLUGS

LINEMAN IN LILLIPUT. Seth Micklow, retired Michigan Bell Telephone man in Marquette, wrote the Michigan Bell to comment on a recent article in which he had read that, "Mr. Kappel dug holes so fast that he got to be president of AT&T. I was small, but I dug holes, too. When stringing wire, the tall, lanky lineman walked up a pole, threw a leg around it and reached out on the cross arm to tie the wire.

"As for me, I had to run up the pole to keep up, crawl out on the cross arm and *then* climb the cross arm pin to tie in."

•

HERE BUT THERE. "When answering the telephone, secretaries to executives are often obliged to create some rather bizarre reasons why their Mr. Wheel can't be reached," comments *Television Age*.

"We were given one the other day that definitely belongs in any good secretary's repertoire. We asked to speak to the girl's boss. There was a short pause. Then: 'I'm sorry he's not in right now because he's leaving in a few minutes for Newark.' "

•

COUNT TEN. Gist of a recent telephone dialogue as faithfully reported by the aggrieved party:

"Hello, hello, hello."
"Yes?"
"Is this Plum 5678?"
"No, this is Pear 8765."
"Oh, well, is Mr. Schnitzelbank there?"
"No one by that name lives here."
"Well, is Mrs. Schnitzelbank there?"
"No, she——"
"Well, isn't this Plum 5678?"
"No, as I said, it's Pear——"
"And Mr. Schnitzelbank isn't there? Or Mrs. Schnitzelbank, either?"
"No, you——"
"Well, then, you hang up, I must have the wrong number."

•

A LINE FOR THE INSTALLER. The installer stared doubtfully at the formidable looking animal lying on the doorstep. "What kind of a dog is that?" he asked the little old lady.

"Don't rightly know," she said. "My brother sent it from Africa."

"Well," the installer hesitated, "it's the oddest looking dog I've ever seen."

The prim lady nodded her head. "You should have seen it before I cut its mane off."

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Telephony

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Since 1901

June 29, 1957

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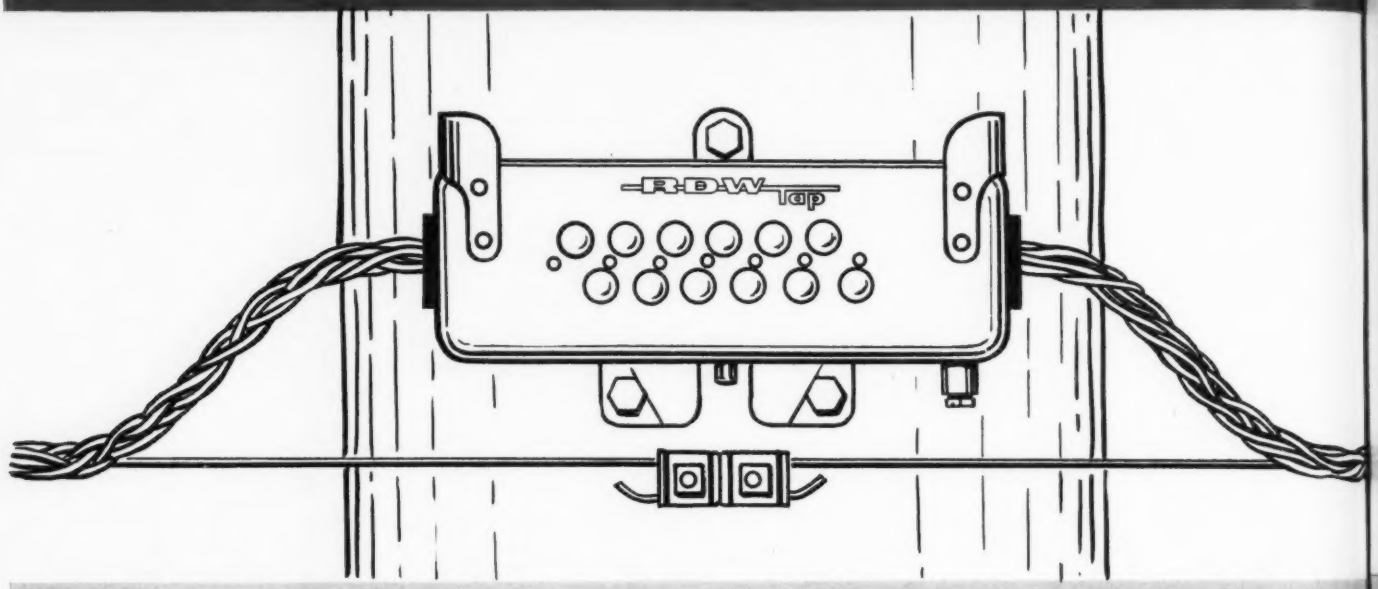

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1. Mount the RDW TAP with the lag screw bracket to the pole without gaining.
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The RDW TAP provides a low-cost maintenance test point, and additional drops can be installed without opening splices or installing additional equipment. Sizes range in 6, 11 and 16 pair capacities.

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*Rural Distribution Wire

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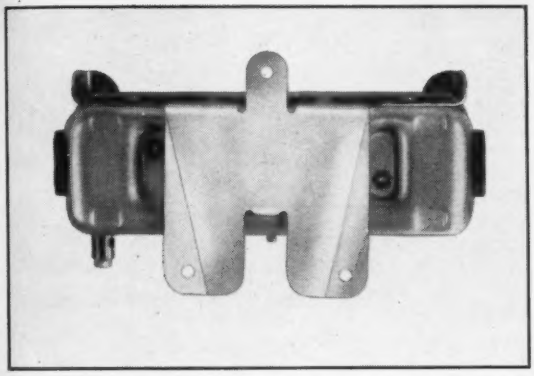
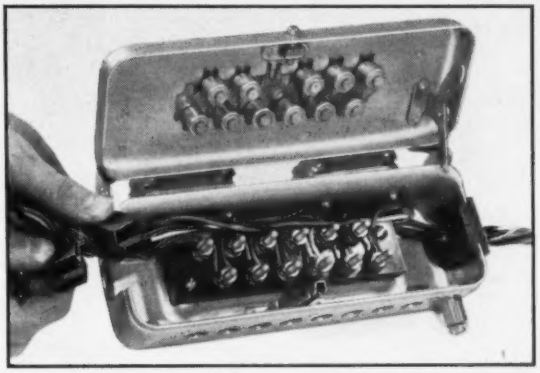


Bracket for mounting direct to the pole without gaining.



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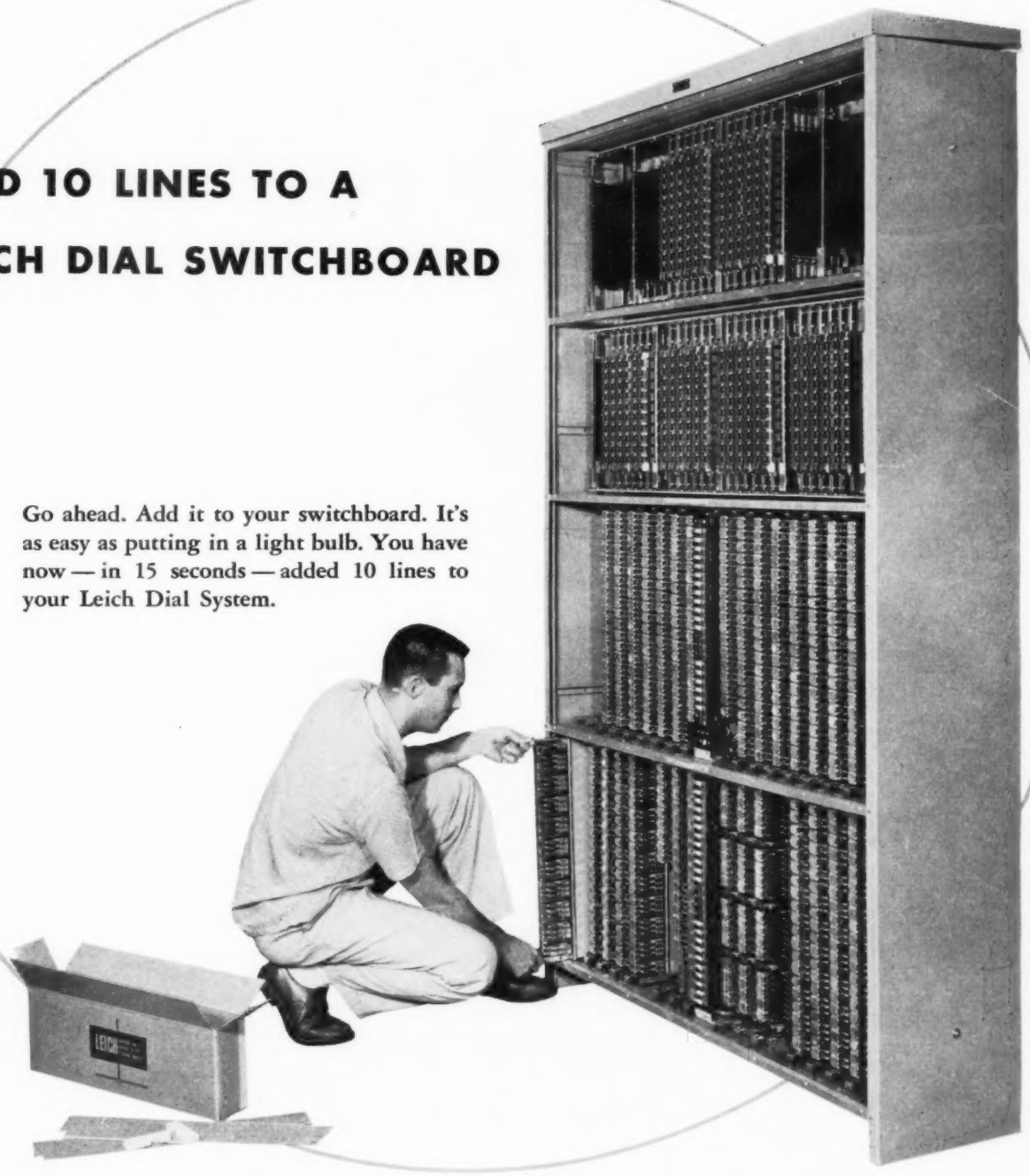

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IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR

Bell System representatives testify at FCC radio frequency hearing. FCC criticized by house committee for "fraternizing" with radio and television industry. Beirne elected to 10th term as CWA president.

IN *TELEPHONY* of June 15, mention was made of the testimony of Independent telephone company witnesses and the United States Independent Telephone Association before the Federal Communications Commission in the 890-megacycles hearings now going on. During the week of June 17 to 21, Bell System witnesses had their turn. They emphasized the importances which the telephone industry places upon the current proceedings to allocate radio frequencies in the spectrum above 890 megacycles.

Gordon N. Thayer, chief engineer of the American Telephone & Telegraph Co., said that microwave radio has become an indispensable tool in the rendition of common carrier telephone-telegraph communications service in the United States. Thayer reviewed the progress and improvements made by the Bell System in radio-telephone usage from 1915. He referred to the TD system (3,700—4,200 megacycles) now operating, the TH system (6,000 megacycles) which goes into production in 1959, and the TJ system (10,700—11,700 megacycles) now in field tests.

The TJ system will make use of frequencies considered a "wasteland" a few years ago. As a result of all forms of radio use, to date, which handle 22 per cent of all its long distance circuit mileages, the Bell System has been able to reduce interstate telephone plant average circuit mile costs from $72 in 1946 to $51 in 1956—with much greater economies in sight through increasing use of microwave improvement.

The gist of Thayer's technical testimony was that the Bell System, which has pioneered and perfected much of this improvement and has reclaimed so much of the spectrum for public use, should in the public interest be assured, through frequency allocation, of operating rights in the future to carry on its use of microwave for telephone industry operations.

Thayer's testimony emphasized at the very outset the very great "importance" which the Bell System attaches to these 890 plus megacycle proceedings. And well he might. Radio is now used for more than half of the Bell System's transmission of radio, television, and long distance telephone conversations. (The other half is carried, for the most part, by coaxial cable.) Thayer said:

"Microwave radio has become an indispensable tool in the rendition of common carrier communication service to the people of this country. It is now being used extensively by the Bell System and other common carriers to provide telephone, television, and other communication services to the general public, and we believe that such use will expand greatly in the future.

"The use of radio provides highly desirable diversification in plant facilities and this contributes to the overall reliability of the service of the telephone companies.

"Radio facilities have been especially valuable in the construction of express and by-pass routes and in otherwise meeting communications requirements essential to the national defense. . . ."

The TH system referred to by Thayer as going into operation late in 1959 shows promise of an increase in capacity to more than 13,000 telephone conversations or 12 TV programs (black and white or color or closed circuit) plus more than 4,000 telephone conversations.

In addition, the system will provide an increased capacity for transmission of "digital" information used in teletypewriter and data transmission. It will have extremely fast switching equipment for bringing in alternate equipment or channels in case of component failures or atmospheric disturbances.

In other words, the new "TH" will make highly efficient use of overcrowded radio spectrum, promising to increase by more than three times the information-handling capacity of radio relay systems occupying comparable spectrum space.

Other Bell System witnesses in the microwave hearings included James B. Fisk, executive vice president of Bell Telephone Laboratories; Francis M. Ryan, AT&T radio engineer; and E. T. Lockwood, assistant vice president of AT&T in the Business Relations Department.

Mr. Fisk's testimony developed the magnitude of the Bell Telephone Laboratories work on radio, which he estimated would amount to 114 million dollars from 1914 to 1957 included. During this long time interval, research has provided techniques which have extended the area of usefulness in the radio spectrum from 100 megacycles to 100,000 megacycles.

He discussed the circular waveguide system and what it promises to do in the realm of increasing capacity of facilities for telephone traffic. But since the circular waveguide system

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will not be available for some years, and could only be used in very heavy traffic routes, Fisk stressed the importance of permitting the telephone industry or so-called "common carriers" to continue to make liberal use of radio frequencies in the area of the spectrum concerning which the FCC hearings are being held.

Testimony of AT&T Radio Engineer Ryan bore the brunt of the technical presentation for the Bell System to the FCC. It was in two parts. In the first part he touched on (1) the impracticability of telephone companies sharing frequencies with other industries; (2) the use of microwave frequencies by telephone companies in metropolitan areas; (3) undesirable engineering standardization for microwave equipment; (4) conservation of frequencies; (5) the advantages of common carrier utilization of frequencies; (6) the comparison of telephone company with other industry methods of using microwave, and (7) the advantages of group operation.

The second part of Mr. Ryan's testimony dealt with recommendations for frequency allocations to the Bell System.

The testimony by Mr. Lockwood elaborated on earlier testimony relating to the economical operations made public by telephone company use of microwave. He also referred to the detriment to the public at large which would result from the increased cost of telephone service by the diversion of business from common carrier to private systems where radio frequencies were generally allocated for that purpose. This reference stressed the probability of "cream skimming" whereby telephone companies would be left with broad and unprofitable facilities for operations.

FCC Spanked in Report

A House Anti-trust Sub-committee has criticized the FCC for fraternizing with the radio and television industry. It advised the regulatory agencies to adopt a "code of ethics" prescribing "informal" meetings that it said had become a practice in recent years. "The evidence demonstrates that, for at least the past 10 years, an air of informality has surrounded cases pending before the commission," a report declared.

The sub-committee conducted extensive hearings on whether the seven-member commission was discharging its "anti-trust responsibilities" in the broadcasting field.

In the report, the house sub-committee said testimony had included many references to "private conferences and discussions" between commission members and industry representatives on pending cases.

The report stated: "The committee recognizes the need for some informality in certain phases of the commission's work, but where conflicting rights or claims of parties are being adjudicated, informal 'ex parted' discussion between a commissioner and a litigant or his representative treads dangerously to, if it does not trans-

REA Makes Telephone Loans in Three States

The Rural Electrification Administration announced granting of four loans in three states recently, Montana, North Dakota and Texas. Details follow:

Northern Telephone Association, Shelby, Mont., $161,000, second loan (June 11).

The borrower plans to use these funds to furnish improved service to 21 rural families who own their own lines and initial service to 74 farm families now without telephones. The present subscribers plan to abandon their own facilities.

The Northern Telephone Association will expand its system, install two-way radio equipment and reimburse the association for general funds already expanded on REA-approved subscriber connections.

The two loans, totaling $891,000, will enable the cooperative to furnish new and improved service to 1,055 subscribers. The system will consist of automatic exchanges at Devon, Etheridge, Kevin, Oilmont, Sunburst, Sweetgrass and Winkler. All of the exchanges are in operation.

Riley Childers is president and Edward E. Mosier is manager of the Northern Telephone Association.

•

Harris-Fort Bend Telephone Co., Sugar Land, Tex., $490,000, first loan (June 13).

The new borrower plans to use these funds to convert its common battery system, serving 820 subscribers, to automatic operation, and to serve 655 farm families now without telephones.

The company plans to construct a new combination automatic central office and headquarters building in Sugar Land.

Thomas L. James is president and manager of the Harris-Fort Bend Telephone Co.

BEK Telephone Mutual Aid Corp., Steele, N. D., $113,000, third loan (June 14).

With these funds, the borrower plans to serve 108 farm families now without telephones, and construct new headquarters facilities in Steele. The borrowers' Kintyre exchange will provide dial service for 74 of the subscribers. The remainder will be switched by the Northwestern Bell Telephone Co.

The new loan brings the total received by the BEK cooperative to $1,983,000 which will enable it to offer new and improved service to 2,520 rural subscribers and switchers. The system will consist of nine exchange areas at Dawson-Tappan, Hazelton, Kintyre, McKenzie, Pettibone, Regan, Robinson, Tuttle and Wing. All are in operation except the one at Regan which is slated for cutover this fall.

George L. Jackson is president and W. B. Van Fleet is manager of the BEK Telephone Mutual Aid Corp.

•

Texas-Midland Telephone Co., 1520 Life of American Building, Dallas, Tex., $192,000, first loan (June 14).

The borrower has recently acquired the Kopperl and Acton exchanges from the Federation of Independent Telephone Exchanges which operates a number of exchanges in central Texas. The Federation is also an REA borrower. The two exchanges furnish magneto and common battery telephone service to 152 rural subscribers. Commercial office facilities will be leased in Dallas.

Texas-Midland plans to convert the facilities to dial operation, construct automatic central offices at Kopperl and Acton, and add line to serve 246 new rural subscribers.

C. J. Wimer is president and manager of the Texas-Midland Telephone Co.

gress, the outer limits or due process of law."

This matter of relationship between the FCC and the industries it regulates is certain to be a matter of principal interest to the house sub-committee on "legislative oversight" during its coming study of all federal regulatory agencies. The sub-committee has just begun staff studies. The judiciary sub-committee is headed by Representative Celler (D., N. Y.). The report urged an FCC code that would "remove any doubt" concerning the impropriety of private talks between government officials and outsiders about matters awaiting a decision by the agency.

It noted that the Civil Aeronautics Board, (CAB), which regulates commercial aviation, had such a code. Yet, CAB officials appearing before a senate sub-committee recently were questioned on the same point—informal contacts with outside agents—because of "leaks" of confidential information, some affecting the stock market.

The house report did not cite examples of the "informality" it had deplored. However, its comments followed criticism of the commission's handling of a 1955 case involving the sale of television station WPTZ in Philadelphia by a Westinghouse subsidiary to the National Broadcasting Co.

A few months after the commission had approved the transaction, the anti-trust division of the Department of Justice, instituted grand jury proceedings and filed suit against the participants. The Celler sub-committee criticized the commission for not having looked deeper into the anti-trust aspects of the case, and secondly for its poor liaison with the Department of Justice. The sub-committee commended the Department of Justice for "vigilance" in pursuing its inquiry into the Philadelphia transaction, but it said more "effective liaison" between the two government agencies was of "prime importance."

"YOUR WISH FOR COLORED TELEPHONES HAS COME TRUE."

CWA Convention

The re-election of Joseph A. Beirne to his 10th term as president of the Communications Workers of America (CWA), following the first contest for that office in the history of the union, was the feature of the 11th annual convention. The Kansas City Municipal Auditorium, on June 18, was the scene of the balloting which defeated A. T. Jones, a vice president of the CWA by a vote of 173,077 to 83,937.

The convention votes under a representative system by which delegates from each local vote for the entire membership of that local. Actual attendance at the Kansas City meeting was estimated at less than 2,000.

Following the election for president, Jones was defeated for re-election as one of three vice presidents of the union. James Massey, Atlanta, a CWA representative, defeated Jones by a vote of 154,770 for Massey to 101,410 for Jones. Two other vice presidential elections — John L. Crull and Ray Hackney, and Secretary-Treasurer William A. Smallwood, were unopposed.

Former President Harry S. Truman addressed the convention for the third time in its history.

In another convention action the delegates approved a billion-dollar life insurance proposal for union members, sending it out for a referendum to the union's membership. It calls for a $1.00 per month increase in per capita dues and provides life insurance starting the first year at $1,000 per member rising by $1,000 each year to a top of $4,000. Pensioned members of the union after the plan goes into effect would get $500 worth of insurance the first year, $1,000 each year thereafter.

Delegates also approved motions which called for "dedication and continuance" in the fight for improved liberal legislation both in the U. S. and Canada, a renewed campaign to see that all members of the union and their families register and vote, and renewed political action.

The number of resolutions which this telephone union approved regarding public power development was remarkable. The resolutions gave far more attention to the Hell's Canyon dam and other public power proposals than to the telephone business as such. Most of these followed the line of advocating government ownership of power facilities including atom power plants.

One resolution repeated the CWA opposition to the exemption in the federal wage-hour law of wages for telephone operators at small exchanges.

The convention opposed rapid tax amortization programs, called for "comprehensive" river valley development, and called on the Atomic Energy Commission to confer with U. S. and foreign scientists to bring out into the open the debate on radioactive fallout.

The convention went on record in support of the United Nations, authorized an adequate education program within the union, and agreed to work for better farm-labor relations.

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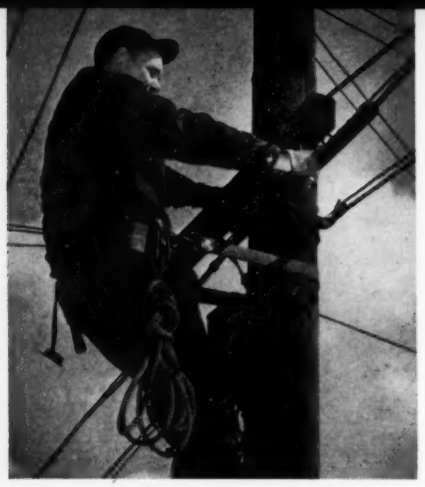

THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITORIAL DIRECTOR

"CONSUMER REPORTS" predict that the Picture-phone—the talk-see instrument—is only the beginning. Combining telephone with television in an in-the-house hookup has brought all kinds of ideas to manufacturers of consumer goods.

In the kitchen of tomorrow, for instance, there is to be a no-hands telephone that lets the housewife carry on a local or long-distance chat while unwrapping the frozen dinner. This telephone could be answered by a touch of any one of a number of push buttons strategically located around the room.

The same telephone system, it is claimed, could also be used to activate equipment around the house, start meals, close windows, or let the cat out.

Nor need there be a harsh, commanding jangle from this telephone-to-be. It can sing a tune or issue a soft soothing coo to indicate that someone is on the other end of the line.

This all sounds fine, but personally we have always been of the opinion that the sound of ice clinking in a glass would make the most pleasing signal to notify one that he is wanted on the telephone.

•

Ventilating heaters are rapidly increasing in popularity with cable splicers who use them while working in manholes. The danger of gas in manholes is increasing because of high pressure mains paralleling underground cable runs in most cities. Rather than take a chance, splicers generally prefer to use continuous forced air ventilation during the time they are working in a manhole. This constant change of air makes the manhole safe from explosions or oxygen deficiency.

One heater of this type is designed for year-round service and operates on propane gas. In warm weather, the unit functions as a ventilator, forcing a large volume of fresh, clean air into the manhole. When winter comes, the unit is converted into a ventilating heater and forces heated fresh air into the manhole.

•

We have had several inquiries of late from small operating telephone companies for information as to where they could have repairs made on electrical testing instruments.

We have investigated and learned that Instrument Laboratories, 315 W. Walton Place, Chicago 10, Ill., have facilities for servicing, repairing, calibrating and certifying of electrical meters and testing equipment. Undoubtedly, there are other firms equipped to do similar work, but we do not have information on them at the present time.

There are probably many good testing instruments gathering dust on storeroom shelves today when a few dollars spent for repairs would place them in operation again. This would certainly prove to be a worthwhile investment for any operating telephone company.

•

At Minneapolis-Honeywell, where they build thousands of automatic devices, they still place a big value on the brainpower of people. Last year, this company's employes thought up 5,630 ways of doing things better and earned the thinker-uppers $39,131.

In the 13-year history of the employe suggestion system, more than a quarter of a million dollars have been paid out. The moral is: ask your employes for ideas.

The employe suggestion system should prove to be of real benefit for any operating telephone company.

•

Engineers of the Michigan Bell Telephone Co., with the able support of its management, have made great strides in recent years in the development of new concepts in communication. They have been first, or among the first, in the test and adoption of such new items as rural distribution cable, completely buried cable distribution systems in new housing areas, etc.

The writer, on a recent visit to New York City, enjoyed needling a friend in the industry about the Michigan Bell engineers' accomplishments which have been made possible without the able help of laboratory technicians or prolonged periods of test.

Pushed for an explanation, our friend conceded that these fellows have been extremely lucky. First, they are not cursed with termites, gophers and other rodents that attack unprotected buried cable in many areas. Furthermore, he stated, Michigan produces the only telephone men who have the ability to walk on water!

•

On a trip to the Eastern Shore of Maryland recently, the Blain family—dogs and all—paid a visit to Chincoteague Island off the Virginia shore on the Atlantic Ocean. This is a quaint little town and anyone who has ever eaten Chincoteague oysters will readily admit that they are the finest in the world.

This little island also holds a pony penning each year. At this time, wild ponies raised on nearby Assateague Island are swum over to Chincoteague where they are sold to the public for the benefit of the local volunteer fire department.

We were surprised, also, to note that the telephone company there has considerable construction work now in progress on that somewhat isolated island. Indeed, one must travel far these days to get away from telephone activity and expanding services.

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A new battery with what has been

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termed "virtually unlimited shelf life" and using ammonia gas as a trigger, has recently been developed.

The producers foresee wide industrial and commercial use for the battery which, they state, has applications as:

An auxiliary power supply for cold weather for emergency starting of cars and other vehicles.

A light-weight auxiliary power source for aircraft or marine electrical systems.

An emergency home power supply.

It may also be used in emergency lighting and power systems in factories and hospitals. It should likewise prove ideal as reserve power for any common battery or dial telephone exchange.

The battery, it is claimed, can remain in inert storage for years until brought to full power in one-tenth second by an internal burst of ammonia gas. It is not activated by the conventional liquid method, but by ammonia vapor released under pressure.

The battery will operate efficiently at temperatures minus 65 degrees F., to plus 165 degrees F., according to the manufacturers. The companies that have developed this battery state that its simple structure—cathode and anode joined by a blotter-like "bridge," plus an ammonia-vapor triggering device—makes possible nearly unlimited variety in container size and shape. These sizes and shapes include dimensions of conventional auto and flashlight batteries.

•

Some of the power companies have relieved the current engineer shortage to a considerable extent by training female high school graduates to handle many of the routine calculations and clerical functions previously handled by engineers.

It would seem that a similar arrangement could be used to advantage in the telephone industry.

There is every reason to believe that the proper use of technicians and clerks makes possible a method of increasing the technical productivity of engineers and at the same time decreasing the over-all engineering cost. In many cases, engineers devote at least half of their time to clerical duties such as drafting, etc., that are not actually engineering in nature and could be handled equally as well and at a much lower cost by any properly trained clerk or technician.

•

It is claimed that we only have about 11,000 working days at our disposal if we graduate at 22 and retire at 65.

Plant Man's QUIZ

By RAY BLAIN, Technical Editorial Director

Q. What is the vibration damper as used on open wire and why and when is this device considered necessary?

A. The Spiral Vibration Damper provides a simple inexpensive means of eliminating or reducing wind induced resonant vibration in small solid wires as used on overhead open wire construction.

When conductors are properly installed with low normal tensions, vibration is not ordinarily a serious problem.

However, in some areas where low temperatures or continuous high winds are prevalent, or where high normal tensions are knowingly used to correct clearance or separation problems, a fairly large amplitude of vibration may develop.

In order to reduce or eliminate these difficulties, the spiral vibration damper was developed.

The Spiral Damper is an open helix of insulated Copperweld wire, 50 inches long, which can be quickly and easily installed over a solid wire conductor. It is designed for use on No. 8, No. 10 and No. 12 AWG line wire.

With the inside diameter of its helix larger than the diameter of the line wire, the damper is free to bounce and make intermittent contact at a multiplicity of points on the line wire which provides a continually changing effective weight and opposes the conditions tending to set up resonant vibration.

•

Q. Why does the modern telephone dial have all of the numerals and letters on a ring outside the finger wheel? Most of these dials have a dot or a triangle under the holes in the finger wheel. It would seem a much better plan to have the numerals under the holes in the finger wheel and the letters on the outside ring.

A. We are inclined to agree with you because it would seem that this would reduce confusion between the red and black "O" and would tend to reduce wrong number calls.

One manufacturer advises us though that they have tried all types of letter and numeral combinations and arrangements and that the system now in general use has proved the most desirable.

•

Q. What is the difference between the Analog and Digital computers?

A. One authority on the subject whom we have consulted gives us the following explanation.

The Analog data processing machine, as the name implies, processes work electronically by analogy. It takes measured amounts of information, performs a set routine of processing, and presents this information in a measurable form.

An example of this is the speedometer in the modern automobile. The rotations of the car wheels are transferred through a flexible cable to the inertial-governor device under the instrument panel. This device then interprets the rate of speed of the car in terms of a dial reading.

The Analog computer can perform only that function for which it was designed, and is not as accurate as the Digital type.

The Digital computer accepts information in the form of alphabetical and numerical characters, and processes this information in accordance with a predetermined sequence that can be varied as required.

•

Q. When a cordless PBX switchboard is installed to serve a small business concern, will it be possible to connect certain telephones direct to the outside trunk lines for night service?

A. Yes. This is a common practice and it proves entirely satisfactory.

One type of cordless switchboard is designed for operation with eight central office trunks, five of which are equipped for night switching.

These five trunks provide a means of connecting central office trunks to predetermined extensions when the attendant is off duty.

Use of the Oscilloscope in Telephony

By **HAROLD B. McKAY, TELEPHONY'S Electronics Editor**

Part 5

A CATHODE ray oscilloscope, like a vacuum tube voltmeter, and other apparatus used principally in the radio field, may be expected to have a grounded input. That is, one side of the input is connected to the chassis or cabinet of the instrument. In many cases, it is necessary when working with feeble voltages to ground the case of the instrument to prevent interference on the "scope" screen from nearby 60-cycle devices. Fluorescent lights can produce some weird distortion of a pattern if they are nearby.

Such grounding, on the other hand, may interfere with the use of a "scope" on a telephone line. That is, the resultant ground that the "scope" puts on the line may interfere with the operation of the equipment.

There are various methods for getting around this situation. If ac tests are being made, a repeat coil can be used between the "scope" and the apparatus being tested. (Be sure the coil is good enough to pass the frequencies and transients expected.)

If dc pulses are being measured (and be sure to use a "scope" with a combination ac or dc amplifier input), the problem may sometimes be solved by connecting the frame of the "scope" to the potential on the apparatus. For instance, if the "scope" must be connected to a circuit carrying battery, where a ground on the cabinet of the "scope" would interfere, then connect the frame of the "scope" to battery instead of ground.

Because the central office battery is grounded, this trick will supply the ground protection against ac interference, but will not interfere with the circuit under test. Use a resistor in series with the battery to the "scope" so if the frame accidentally grounds, it won't blow the fuse.

Other precautions would include suitable grounding on signal generators, bridges or other devices which can be grounded without interference to the telephone line. All apparatus being used together should be bonded to the same ground if possible. Proper terminations on oscillators, apparatus or lines is a must.

Also remember that the "scope" is a voltage operated device and that it has a high input impedance. Therefore, if it is necessary to measure the waveform of a current flow, such as the dc pulsing on a trunk, use a series resistor in the telephone circuit and connect the input of the "scope" across the resistor so that the waveform of the voltage drop can be measured.

A resistor low enough not to interfere with circuit operation, yet high enough to provide a voltage drop large enough for the "scope," should be used. *Fig. 5.1* shows a method of connecting a "scope" to the simplex leg of a long distance trunk. (*Fig. 5.2* shows the trace obtained).

A low value series resistor is used to pass the current, and a high resistance is connected to battery or ground. This protects the instrument from stray ac interference, yet does not interfere with circuit operation.

Another trick in avoiding ac pickup in the instrument is to select a point in the circuit to be tested where the highest voltage can be obtained. This permits the gain of the "scope" amplifier to be reduced; in fact it will have to be reduced to get the trace on the screen.

The small component of ac interference will then be made smaller still and may not be seen in the trace. This refers to ac that might be picked up by connecting leads or the case of the instrument. A "scope" which has internal hum or ac effects on the screen should not be used. Beware of this in cheap instruments *(Fig. 5.3)*.

Transmission Tests

A few preliminary experiments indicate that the "scope" may prove real useful in transmission testing, but this appears to be big enough to become a separate subject. Certainly it would seem that the square wave technique which is used in radio and television could be adapted to telephone circuits.

Of course, the scope will work as a voltmeter and permit the graphical construction of a curve of a cable pair or piece of apparatus. This was shown experimentally by connecting an oscillator to one end of a circuit and then measuring the voltages at different

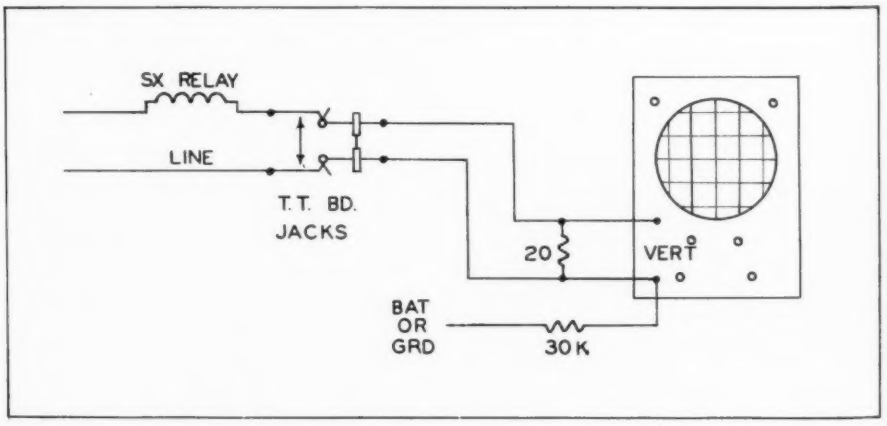

Fig. 5.1. To measure the waveform of current, put a resistor in series with the circuit and let the "scope" measure the voltage drop across the resistor. Here, a 20-ohm resistor is placed in a simplex leg to study the waveform. The 30,000-ohm resistor to battery acts the same as grounding the chassis of the "scope" for shielding purposes, but does not interfere with the simplex.

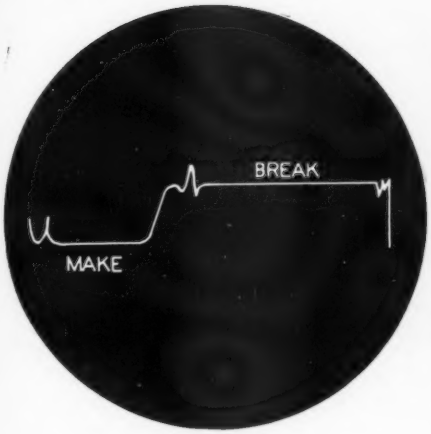

Fig. 5.2. Pattern produced on a simplex leg about 18 miles long. The efficiency of the simplex could be checked by comparing this pulse with the pulses produced by the apparatus feeding into the simplex.

frequencies with the "scope" at the other.

An alternate method used the "scope" and oscillator in parallel at one end of the line only. As the oscillator was rotated through its frequency range the pattern on the "scope" increased and decreased in height as the line absorbed more or less at different frequencies.

A smooth line showed little change as the dial of the oscillator was rotated; one with misplaced loading coils resulting in a pattern which jumped up and down rapidly when the dial was turned. While this does not pin-point the trouble, it might be effective as a quick way to tell a correctly loaded circuit from a bad one.

Termination

The amount of return loss on a line is affected by the termination of the line, among other things. The termination of the line affects the amount of reflected voltage. The reflected voltage can be measured because it may appear reactive and hence change the phase on the line.

An experiment in phase measurement was made with the hook-up shown in *Fig. 5.5*. Here the vertical plates of

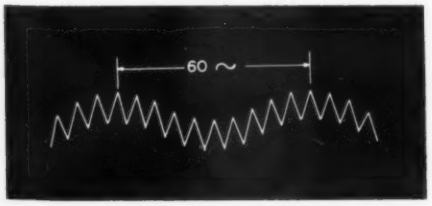

Fig. 5.3. AC hum from nearby lighting fixtures may do this to the pattern on your oscilloscope. The fine up-and-down lines are the wanted signal, the long wave is the 60-cycle interference. Proper grounding or shielding will eliminate it.

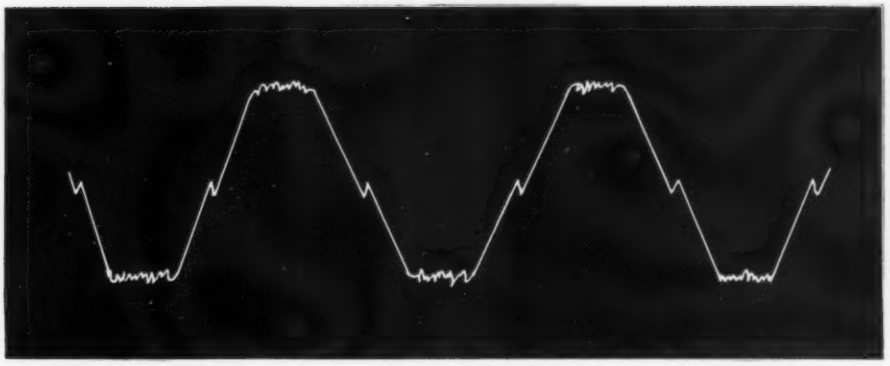

Fig. 5.4. A recurring trace of baffling design like this one may turn out to be nothing more than the output of your own ringing machine. In order to supply "audible" ringing sounds back to the calling subscriber, ringing machines frequently have circuits which purposely distort the output wave as shown here. The rough "teeth" at the peak of each wave produce the sound.

the "scope" are connected directly across the oscillator, hence are directly affected by the oscillator voltage. This voltage is also applied to the cable pair, but through a resistance. The voltage drop, which occurs across this resistor, is the result of the amount of current flowing in the pair. This, in turn, is determined by the amount of reactance, resistance and the termination of the pair. The reactance will change with frequency.

The voltage drop of the resistor is applied to the horizontal plates of the "scope." If the circuit being tested is a constant nature, regardless of frequency, a pattern like the Lissajous figures shown in Part 1 of this series would result (TELEPHONY, June 1). The figure would be either a slanting line or an oval.

With a pair which is properly loaded

(Please turn to page 42)

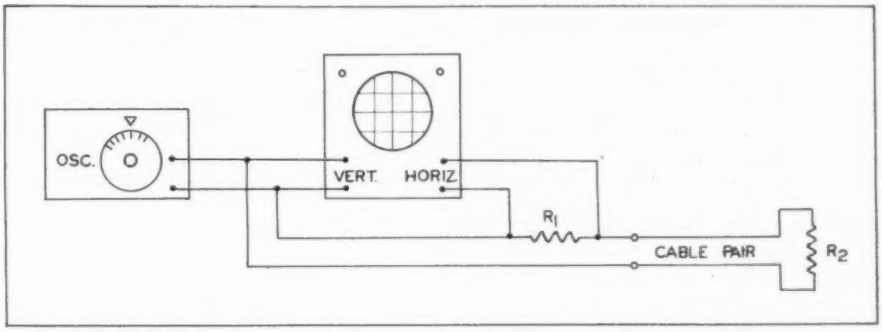

Fig. 5.5. Method of connecting a "scope" to measure phase on a line. Oscillator had 600-ohm output, R1 was 600 ohms, R2 was made variable from 0 to 3,000 ohms for experiments. Pair was mis-loaded and nominally considered to be about 1,100 ohms, but matched on the "scope" better when R2 was about 1,300 ohms.

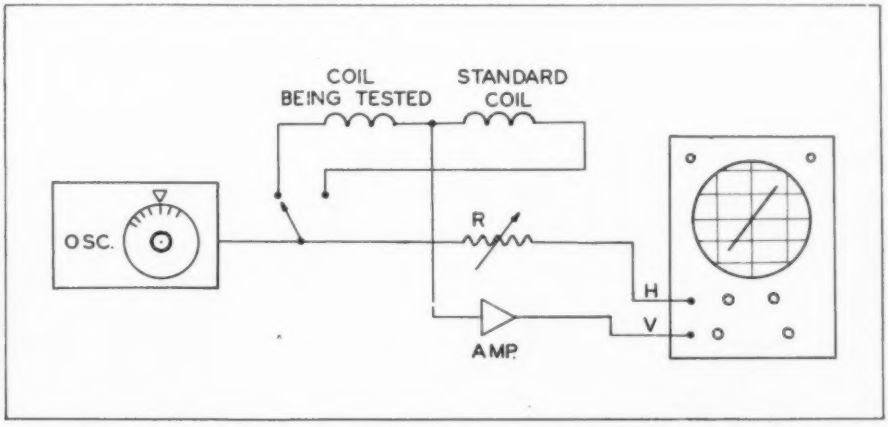

Fig. 5.6. This application of the "scope" is used by the factories which make telephone toroid coils. As a new coil is wound, it is compared with a standard coil as shown. When it is exactly the same, a straight line shows on the "scope," and the winding is finished off. If too much or too little wire is used, an ellipse instead of a line results. (From the Lenkurt Demodulator.)

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Each of these "packages" may mean money in your futu
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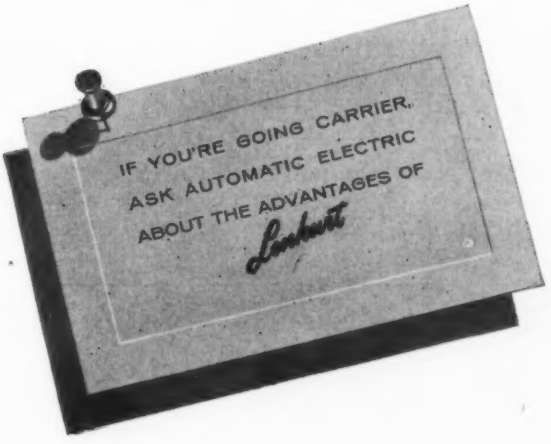

AUTOMATIC ELECTRIC

A member of the General Telephone System—
One of America's great communications systems

GENERAL SYSTEM

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today's Highlights

of finance-taxes-business trends

by Willard F. Stanley

INTEREST RATES GO THROUGH ROOF: The happenings of the last 30 days in the utility bond market have been a sharp and unpleasant surprise to most observers. Five per cent has been generally considered a comfortable ceiling for the interest rate on new "A" rated utility bond offerings. But on June 7, Georgia Power Co. "A" rated bonds were offered on a 5.1 per cent yield basis, far above anything experienced for decades. At the height of the money rate panic just about 4 years ago, the peak rate at which new "A" rated bonds were offered was only 4.2 per cent, which looks low in today's market.

Just previous to June 7 Boston Edison's 25 million dollars of triple "A" rated bonds were offered at a yield which pierced the ceiling in that category, namely 4.53 per cent. Furthermore, when the underwriting syndicate on this issue terminated (just as this is being written) the bonds promptly dropped to a 4.66 per cent yield basis.

This followed a break in price below a 4.4 per cent offering yield on New York Telephone's 70 million dollars of new debt, when that syndicate terminated. And, the end is not yet.

What has been happening to cause such drastic step-ups in bond yields? Obviously, a tremendous demand for long-term money is the chief cause. Federal Reserve policy has been silent and, therefore, not an important contributing factor, except insofar as there appears no immediate hope of assistance from that quarter.

One recent adverse and important factor has been the staggering amounts of municipal and other governmental (non-taxable) bonds which have been coming to market. Demand for bond money must be viewed as a whole, and this type of demand has probably exerted a material influence on the upward trend in interest rates.

There had been sparse, but mildly hopeful, signs of possible reduction in demand for long-term funds. Continued decline in new housing contracts versus last year indicates ultimate lowering of requests for mortgage money. But, after a moderate May schedule, industrial corporations have swung back into the funded debt offering market in a big way, while utility demands continue above last year.

(Please turn to page 30)

Mr. Stanley, formerly financial vice president of Southwestern Public Service Co., an electric utility with over 160 million dollars in assets, is president of Corporate Services, Inc. of New York City. He is a member of Controllers Institute of America and New York Society of Security Analysts. He serves on three committees of the Controllers Institute having to do with federal taxation, social security and finance management. His articles are appearing once a month in TELEPHONY.

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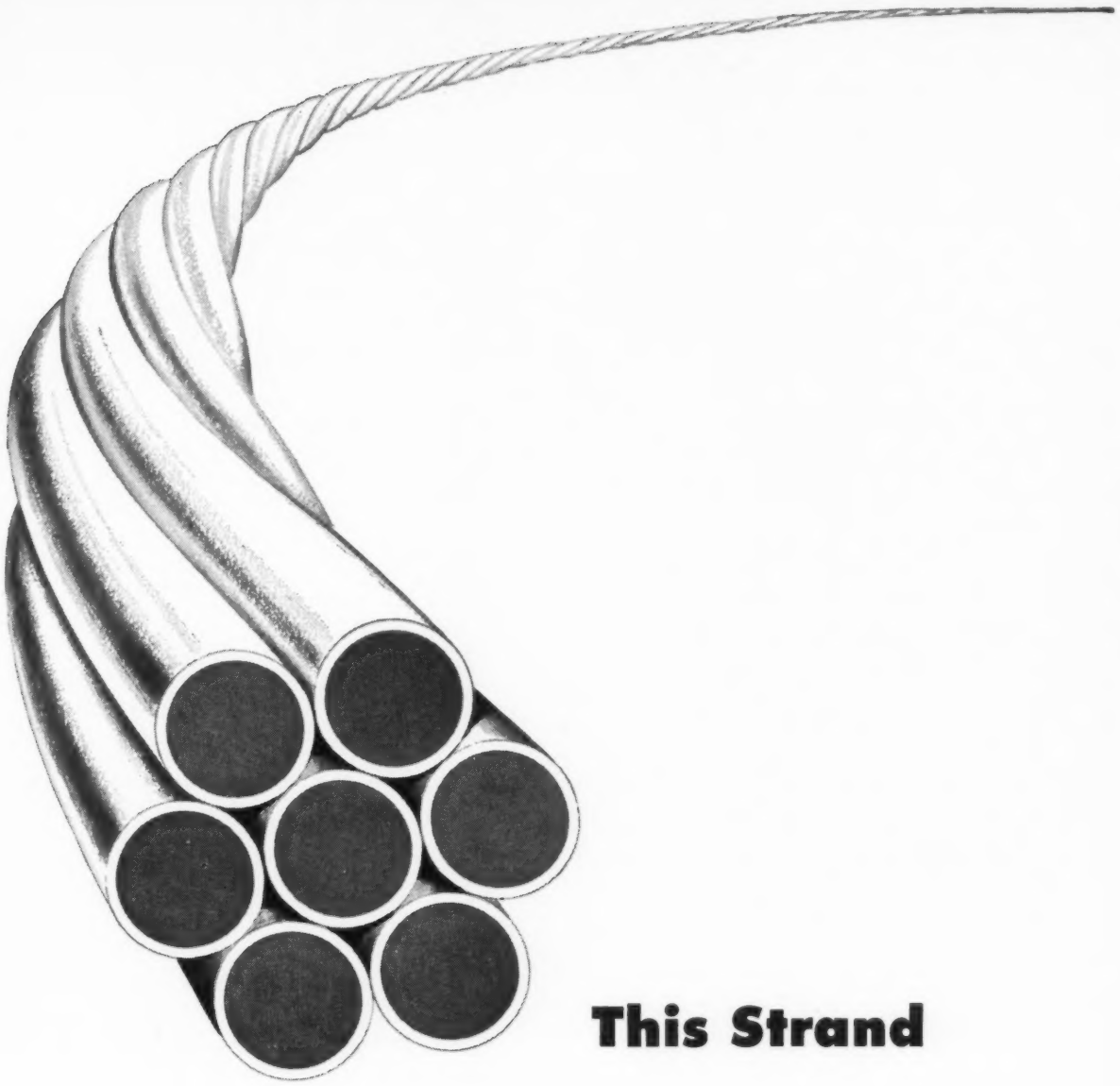

This Strand Wears a Special Suit of Armor

The zinc coating applied to strand has only one function—to keep moisture and corrosive atmosphere away from the steel wires. Obviously, rust cannot begin its destructive work as long as the coating holds up.

More than twenty years ago Bethlehem developed bethanizing, an electrolytic process that resulted in a tighter bond between coating and wire. An equal advantage was the high degree of ductility achieved. The merits of bethanizing are so widely recognized that bethanized strand has become synonymous with top quality.

Because of the great ductility of the zinc, the coating is virtually immune to checking and peeling. This is true even under deformation. Thus there are no tiny cracks or pits in which rust can gain a foothold. Bethanized strand is protected by an impervious armor that lasts for years.

Complete details are available from the nearest Bethlehem office. Call or write; we'll be glad to supply whatever information you may require.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
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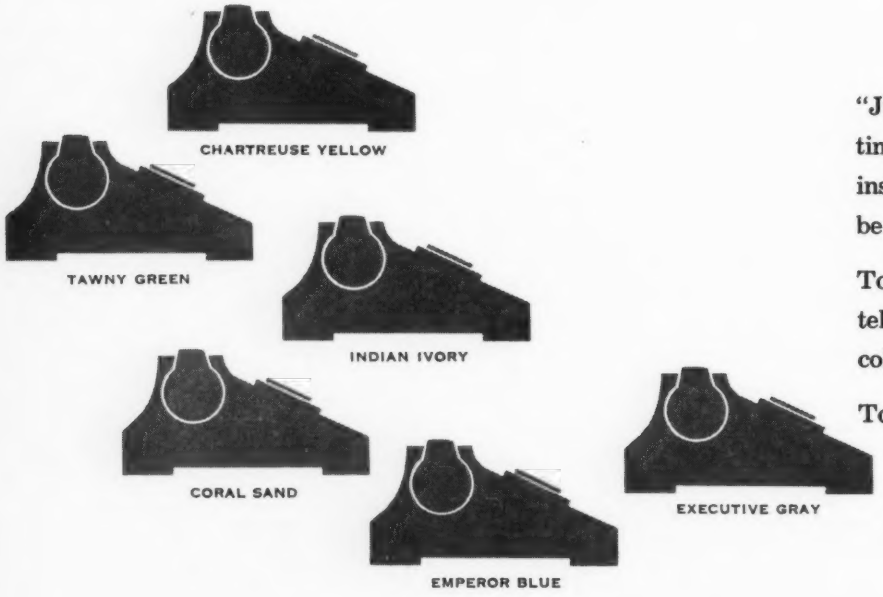
RICHLAND RED

NORTH COLOR-TONE TELEPHONES



CHARTREUSE YELLOW

TAWNY GREEN

INDIAN IVORY

CORAL SAND

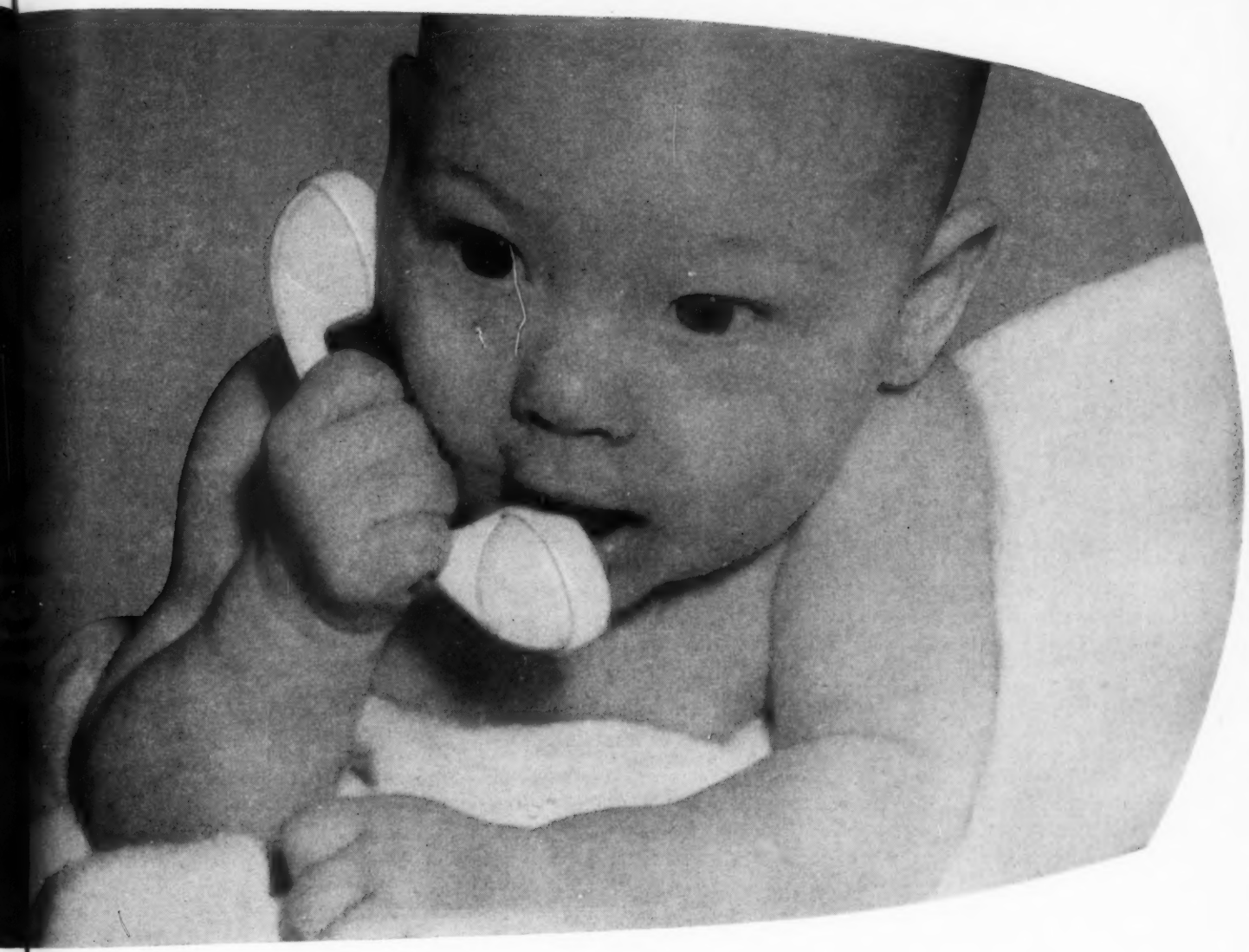
EXECUTIVE GRAY

EMPEROR BLUE

"Junior" is growing up in an age of color! By the time he grows up and orders his first telephone installed, all residential and most office phones will be in colors. But that's twenty years from now.

TODAY — thousands of subscribers want colored telephones — thousands more can be "sold" on colored telephones.

TODAY — you can order North Color-Tone tele-



FOR THE *Young in Heart*

phones from stock—in a choice of Richland Red, Chartreuse Yellow, Tawny Green, Indian Ivory, Coral Sand, Emperor Blue, and Executive Gray.

TODAY — when you buy North Color-Tone telephones you get merchandising aids — mailers, envelope stuffers, newspaper ad mats, counter cards, display materials—to help you merchandise Color-Tone telephones as revenue producing extensions.

The North Color-Tone telephones are the finest telephone instruments you can offer your subscribers—in transmission, in reception, in color styling!

The North merchandising program is the most powerful assistance you can get to help YOU increase your extension telephone revenue!

Write for full details or see your North sales representative.

NORTH ELECTRIC COMPANY

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On April 10 and 12, two "A" rated electric utility issues were offered at an average yield of 4.55 per cent. The 5.1 per cent offering basis of Georgia Power is a 12 per cent increase in cost of this kind of money in slightly less than two months.

And, the upward trend is confirmed (if confirmation were needed) by our customary thermometer of recent new issue bids compared with their offering prices. Wall Street Journal's tabulation at June 12 showed 17 new utility issues with an average yield on the basis of then bids 9 decimals (.09 per cent per annum) higher than the average yield based on offering prices.

What does the future hold? One hesitates to predict. With business activity remaining high and prices still edging upward, the threat of continuing inflation seems likely to deter the Federal Reserve from taking any steps to alleviate interest rates to borrowers. Schedules of new offerings bid fair to remain heavy in most categories of funded debt.

What, then, should be done by utilities needing funded debt money soon? Should they accept these phenomenally high interest costs or hold off in the hope of happier days? In reaching a decision on this point another question might first be answered, i.e., is the utility going to need common stock equity money in the near future to improve or maintain the equity ratio in its capitalization? If so, the sale of bonds might be temporarily postponed (in whole or in part) and the funds raised by sale of additional common stock. The price-earnings ratios and yields on most utility commons are still attractive to the issuer. We are not recommending adoption of this course generally, but feel it is worthy of being explored where the circumstances are suitable.

If sale of funded debt is to go forward regardless of present high rates, another question must be considered, namely, should an attempt be made to reduce present peak interest by agreeing to eliminate the right to redeem the issue for five years? Some utilities (and many industrial companies) have already succumbed to this temptation. The decision reached may well vary between companies because of particular circumstances, but it should be remembered that foregoing the redemption privilege for five years may actually operate to prevent economic redemption for a much longer period, if interest rates should fall within the five years and then climb again and stay on a high plateau for a long time. In this way, loss of savings from refunding could be extended to 10 or 15 years, or even, conceivably, to the entire life of the bonds — because of the five-year redemption prohibition.

* * * *

STOCKS HOLD MOST OF SPRING RISE: About mid-May, stocks reached a peak for 1957, from 1 per cent to 2 per cent above the Dec. 31 close, according to the New York Times combined 50 stock average. This was followed by a mild temporary reaction which was largely "technical." The upward movement was soon resumed, however, and this average recently made a high high for the year, but then fell back and at June 21 was about 1 per cent below the Dec. 31, 1956 level, having dropped between 2 per cent and 3 per cent from a month ago. It is still our expectation that the stock averages will continue to fluctuate in a range of not more than 10 per cent over or under the 1956 close. Prices in the market seem too high and yields too low for a runaway market on the upside, while better than expected overall business activity and continued favorable statistics generally seem to make a drastic drop in price levels unlikely for the remainder of the year.

* * * *

NON-TAXABLE DIVIDENDS: We had expected to continue discussion of this subject here, but must postpone it until next month, due to the extra space devoted to the interest rate crisis.

DIRECT DIALING FOR OLDER EXCHANGES

OLDER common control telephone offices such as panel and No. 1 crossbar can be modified to handle customer dialed long distance calls, according to the *Bell Laboratories Record*. The modification can be made by adding auxiliary senders to the central office equipment, so that 10 digits may be handled.

The old eight-digit senders are retained without major modification, but operate in a manner that will call in the auxiliary sender if a Direct Distance Dialing (DDD) code having a 1 or 0 as the second digit is dialed by the customer.

The auxiliary sender is also equipped to convert the panel call indicator pulses put out by the old senders into multi-frequency pulsing to send forward to the toll office. Central offices which do not have multi-frequency supplies can be equipped with auxiliary senders which contain transistor units in oscillator circuits to generate the tones.

Step-by-step offices can be connected into the DDD network by adding senders to the equipment, or by the use of an access code to reach the DDD equipment. Some panel and crossbar offices may use the access code 1-1 to reach adjacent numbering areas.

Billing for calls is planned to be handled on a Centralized Message Accounting Basis (CAMA), wherein a billing operator enters the customer dialed connection to obtain the calling number from the customer, but full automatic operation is under development.

A description of the new system, with block diagrams showing operation, is contained in the June, 1957 issue of *Bell Laboratories Record*. This publication is available for a subscription price of $2.00 per year. The address is 463 West St., New York 14, N. Y.

NEW TV-TELEPHONE LINE SYSTEM

CLOSED circuit television is probably destined to become a large market for lease of telephone facilities. Many approaches to the handling of this sort of traffic have been made. The Bell System's A2 video repeaters enabled the use of short lengths of exchange cable for television pickups, but most permanent studio to transmitter links used special video pairs which are built into some cables.

Slow scan principles have been used to transmit a series of still pictures, which would be of use in some industrial applications, or for identification purposes.

The latest development is a plan to use a narrow band television, that could be transmitted over facilities that will handle up to 25,000 cycles. This will produce a moving picture with a quality considerably less than that of regular TV. However, it would be adequate for many commercial and industrial applications where transmission of fine details is not required.

The new system will work over standard telephone cables for distances of from 10 to 15 miles.

ELECTRONICS IN NEW PLANT

AUTOMATIC Electric Co.'s new manufacturing facilities at Northlake, Ill., will be tied together with an electronic network which will use 360 loudspeakers and over 3,000 watts of audio power. Although the proposed system is still in the drawing board stage, it is going to have features similar to that installed in the electronic system at the Ford Motor Co. plant at Mahwah, N. J.

This installation provides a loudspeaker system which has the following features: (1) A microphone in the plant protection office for emergency announcements to all parts of the plant; (2) An evacuation alarm—an electronically generated tone which sounds like a siren; (3) A fire alarm signal, also electronically generated which sounds like an air horn. This can be touched off from reporting boxes throughout the plant; (4) An electronic time signal which sounds like a bell; (5) Paging facilities; (6) Input for background music, from tape reproducer, record-changer or wired music, or even programs like the World Series.

A priority switching system is built into the circuitry which permits important traffic to automatically suspend transmission of matter having a lower priority. The new system is being designed by the DuKane Corp. of St. Charles, Ill.

FERROELECTRIC CRYSTALS

AMONG the more promising modern electronic materials are the crystals which exhibit ferro-electric properties. This is a condition where a polarization or strain can be built up in a crystal as the result of an applied electrical field. In a sense, the crystal responds to an electrical field as iron responds to a magnetic field; the crystal may even have a hysteresis curve. (This curve represents the residual effect left in the

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material after the polarizing charge has been removed.)

Thus a ferro-electrical crystal may store the effects of an electric charge, just as a piece of iron, by becoming magnetized, can store up the effect of a magnetic charge. This feature can be used in a variety of ways, including that of a memory device in a computer, or even as a device to store telephone numbers in an electronic telephone system.

A number of methods for connecting these crystals up as memory devices have been developed, and a large number of "bits" of information can be stored in a small space. The most popular ferro-electric crystal previously used has been barium titanate, but Bell Laboratories has come up with a new substance known as triglycine sulphate.

The new crystal requires lower switching voltages and is chemically stable. It has a coercive field of 220 volts/cm, and a Curie point (at which it loses its ferro-electric properties) of 47° C. It does not fatigue with repeated operation. Switching times of one or two microseconds can be attained.

A crystal can be built into a multiple memory device by depositing thin strips of metal on a thin wafer of the material. The strips on one side of the crystal are placed perpendicular to those on the other. Where the strips cross, an electric strain can be built up in the crystal which will remain until "erased," thus storing a bit of information. By striping a crystal of 30 lines to the inch, a memory capable of storing 900 "yes" or "no" answers can be made from a crystal one inch square.

"LEPRECHAUN" COMPUTER

THE LATEST item of picturesque speech to emerge from the Bell Telephone Laboratories is the "Leprechaun," a high-speed digital computer. It is named after the tricky sprite of Irish folklore. Built under Air Force contract, the new computer uses far less components than previous computers.

Even so, new techniques have permitted the 9,000 parts, of which more than half are transistors, to be placed in a unit which takes up little more floor space than a television receiver. A feature of the new computer is flexibility. The components can be easily connected and disconnected.

Another important feature is a random-access memory, which provides for immediate delivery of stored information without the loss of time required in revolving magnetic drum systems which must search for data. One of the principles demonstrated in the Leprechaun is that of direct coupled transistor logic. This is a switching system in which transistors perform logic or "brain" functions.

ELECTROLYSIS METER

CORROSION surveys usually call for a recording millivoltmeter of some sort which can be used to detect the minute changes in earth potential which may occur over a 24-hour period. The Bristol Co. of Waterbury 20, Conn., has just announced a new instrument for this use.

Using a smoked paper disc for the recording medium, the millivoltmeter uses the principle of the vibrating needle to reduce drag. By this means, the needle which makes the mark on the chart is vibrated by the flashlight battery powered device. This causes the needle to make a series of dots on the chart. The line of dots traces the voltage curve. The curve may be filled in after the record is made.

THERMISTOR CIRCUITS

THERMISTOR circuits are shown in a new catalog issued by the Gulton Industries. Tables show the resistance ratio versus temperature characteristics of these units, making it possible to compute thermistor resistance at various temperatures.

While the thermistor is generally known to telephone men because of its use in telephone circuits, this catalog is of interest because it shows several basic design circuits such as temperature sensing, amplitude control, time delay and others.

Get this valuable bulletin by writing to Lawrence C. Oakley, Thermistor Division, Gulton Industries, Inc., 212 Durham Ave., Metuchen, N. J. Ask for Bulletin T-100.

REMOTE INDICATOR

A MAGSLIP is a precision three-phase alternator which is often used as a remote indicator for meters or other instruments. It is usually electrically connected to an identical unit by wiring the stator windings of one to the stator windings of the other.

If a permanent magnet rotor is turned about in the first field, the rotor in the second magslip will follow it exactly. Thus one can be hooked to anything from a meter to a weathervane and the second will show its position at a distance.

If you are concerned with this type of device or with instrument engineering, get a copy of Muirheads "Technique." The current issue describes these interesting devices and explains several little known uses for them.

Drawings are excellent in this little paper, each of the three phases being shown in a different color for easy circuit tracing.

Although this paper is printed in England, engineers can get on the

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mailing list by writing to Muirhead Instruments, Inc., 677 Fifth Ave., New York 22, N. Y.

AMATEUR RADIO

AMATEUR radio is probably the easiest way to enter the electronics field. It is an effective way of learning because you learn by doing. Many top-flight radio and telephone engineers keep their hands in the active development of the art. Many "firsts" in the electronic field were developed by amateurs who didn't know it "couldn't be done" so went ahead and did it anyway.

If you would like to join the fraternity of radio "hams," John Rider's latest book, "Getting Started in Amateur Radio" might be just the thing for you. The FCC permits people with little experience to obtain a "novice" license which allows them to put a radio station on the air, and then qualify for full amateur privileges after they have gained some experience.

Rider's book appears to be well suited to getting the tyro started. Just enough theory is given to train the reader for novice qualification. Tips are given on how to learn the five words per minute code requirement, and directions are given for building a simple practice oscillator.

The approach to radio theory is limited to defining various components (such as capacitors, transformers etc.), how they work, and what they are used for. Heavy stuff and abstract theory is omitted.

Following the theory section, a group of study questions are presented. A complete sample examination, with answers, is then given, so the reader can get a good idea of what FCC is going to ask him before he gets his license. The last part of the book gives theory, questions and answers pertaining to the general class license, and a final chapter contains a full reprint of all FCC rules and regulations pertaining to amateur radio operation.

This book contains 136 pages, is illustrated and is called Rider Publication No. 199. The price is $2.40 and it can be purchased from TELEPHONY.

SUPERMENDUR

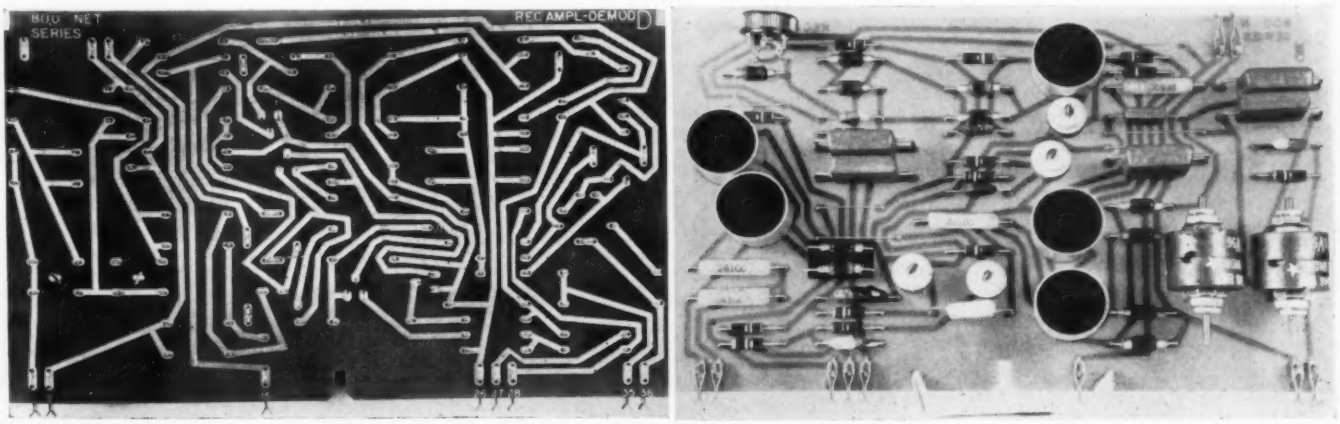
THIS is a new name you can add to the collection of colorful words used to describe new alloys. The new material, according to *Bell Laboratories Record*, will permit reduction in size of magnetic components without impairing performance. It has higher permeability and lower hysteresis losses at higher flux densities than any material which has previously been developed. The new alloy is made of iron, cobalt and vanadium and will be useful in transformers, magnetic amplifiers, receiver diaphragms and memory devices.

TRANSIMULATOR

IF YOU have a need to build various kinds of transistor amplifiers for experimental purposes you will be interested to know that you can now experiment by twirling knobs instead of soldering breadboard layouts together.

The "Transimulator," built by Sprague Products Co., 191 Marshall St., North Adams, Mass., will simulate an ac or direct coupled amplifier stage or put together a multivibrator, switching or phasing circuit.

Common or grounded emitter, base or collector circuits may be built up using PNP, NPN or surface barrier transistors. Everything required for R-C amplifier circuits is built right



Telephone apparatus of the future is going to look like this receiver amplifier-demodulator from a Type P-1 rural carrier. Seen in these pictures are the etched connecting leads (left) which take the place of wiring. On the opposite page (right) of the thin plastic sheet are the various resistors, condensers and other parts. The leads from these go down through the plastic board where they connect to the etched circuit. From the Bell System Technical Journal.

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into the instrument and any circuit may be simulated by turned knobs to the required values and circuit conditions.

OBSTACLE GAIN

THE philosophers throughout the ages have always advised us to turn our losses into gains, but it remained for American GI's in the Korean War to do this with radio waves.

Speaking before the Institute of Radio Engineers last March, R. E. Lacy of the Signal Corps Engineering Laboratories described a series of tests which proved that sharp mountain peaks in the transmission path of a radio wave will actually strengthen the signal on the other side.

Result is that a signal may be as much as 100 million times stronger than it would be with no mountain in the way. High frequency radio waves, it seems, act much like light rays, and are bent downward when passing over a sharp edge of an opaque object.

MICROWAVES

A NEW microwave system using many of the new solid state devices was announced at the European Symposium on Radio Links which was held in Rome in June. Dr. M. J. Kelly and M. B. McDavitt of the Bell Laboratories presented papers describing the new system.

The "TH" as it is called, is designed to make highly efficient use of the overcrowded radio spectrum. It will be capable of carrying more than 10,000 telephone conversations, or 12 TV programs plus 2,500 conversations. It will also provide increased capacity for handling digital information such as that used by teletypes and data transmission circuits.

Dr. Kelly declared that the development of the transistor 10 years ago has triggered off a new era. It is clear, he said, that solid state electronics will almost completely dominate instrument telecommunication in the coming decades. Microwave relay is now used for more than half of Bell System's radio, TV and long distance telephone conversations.

The new TH system will operate in the 5925-6425-mc microwave band. It has eight 10-mc channels in each direction plus two narrow band order wire and alarm channels. Six of the eight bands could be in use at any one time. The other two would be held in reserve to be switched into service automatically in case trouble developed on the others.

The transmitters will have an output of five watts, FM. Isolation between forward and reflected signals at various points in the system is accomplished by microwave ferrite devices. A microwave ferrite switch is employed which can switch automatically to standby equipment in less than a thousandth of a second.

ELECTRONIC NOTES

THE Vamistor, a precision sealed resistor, is completely described in the current issue of Weston Engineering Notes. You can get on the mailing list for this periodical by writing to the Weston Electrical Instrument Co., 614 Frelinghuysen Ave., Newark 5, N. J.

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IF YOU have been baffled by electronic equipment which contains European type tubes, you will be glad to know about a book called "Receiving Tube Substitution Guidebook" by H. A. Middleton. This book marks the first time that easy to follow instructions have been prepared to show which American tubes can be substituted in imported equipment. Wiring changes are shown where necessary. Over 800 receiving tube and 200 picture tube substitutions are given.

The book is published by John F. Rider Publisher, and can be purchased from TELEPHONY.

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A PERMANENT magnet that is really permanent can be made from a material called Ferroxdure, which has been patented by North American Phillips Co. The new material is made of ceramic and uses no critical metals such as nickel or cobalt. Once magnetized it is practically impossible to demagnetize it.

BOOK REVIEW

COMMUNICATION ENGINEERING by W. L. Everitt and G. E. Anner; 3rd Edition. 644 pages, $9.00.

The telephone engineer will probably welcome this volume because it covers many things in the telephone field. Unlike some texts which limit "communications" to radio, this book recognizes that people still use telephones.

The first chapter keynotes the work by pointing out that the communication engineer has the processing of information as his task. This can be regarded as supplementing man's brain power and nervous system, just as the processing of energy supplements man's muscles.

The nature of communications from an information theory standpoint is discussed. Then the authors promptly launch into the basic methods and common problems of electrical communications systems.

A unique numerical analogy is given for carrier system communications, which explains how different messages are sent over the same facility, but the usual drawings of wave-shapes and sidebands are not required so are not used.

After such basically simple explanations of the fundamentals of communications networks, the book takes off at a true engineering level

into network-behavior, analysis and theorems. The material in the book is largely mathematical and to this point, only basic vector diagrams and network schematics are used as illustrations.

However, when the subject of bridge networks is reached, the text is illustrated by an anti-side tone telephone circuit, a duplex telegraph, phantom circuits, repeat coils and telephone repeaters.

FILTERS

A rather comprehensive chapter on iterative filters leads into another on specific wave filters. These contain the design principles of all basic types, from those used in carrier telephony to cross-over filters for hi-fi phonographs.

Most of the last half of the book is in the field of transmission lines, the waves thereon, reflection and impedance matching. While such things as radio antennas and Smith charts get their share of the space, it is gratifying to find a great deal of material on telephone lines—open wire, cable and loading.

This part includes practical matters like the result of line reflections on wire-line picture transmission, and a method for locating reflection points on telephone lines.

A concluding chapter in electromechanical coupling discusses the engineering considerations in the design of telephone receivers and microphones.

This is not a book full of tables and charts for the telephone field engineer. Rather it is for the man who makes the charts and tables. It will have an appeal to all transmission men who are interested in progressing upward in their profession. It will also be useful to the equipment man who wants to rise out of the category of "catalog" engineering and learn the true basis of the art. To the design man, a text like this is, of course, essential.

This is a college level book, and college mathematics are required to fully understand it. The student who is not up on his calculus may still get a great deal out of it, but the going could be rough.

One aid to those who may have obtained their engineering experience in another field is a table of symbols (Roman and Greek letters) and what they stand for in communications.

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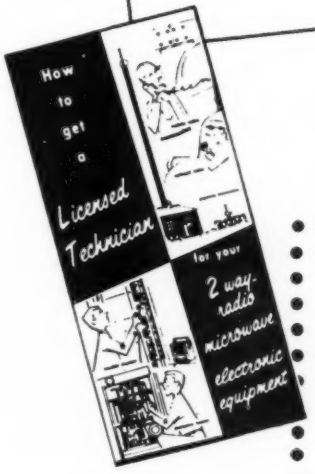

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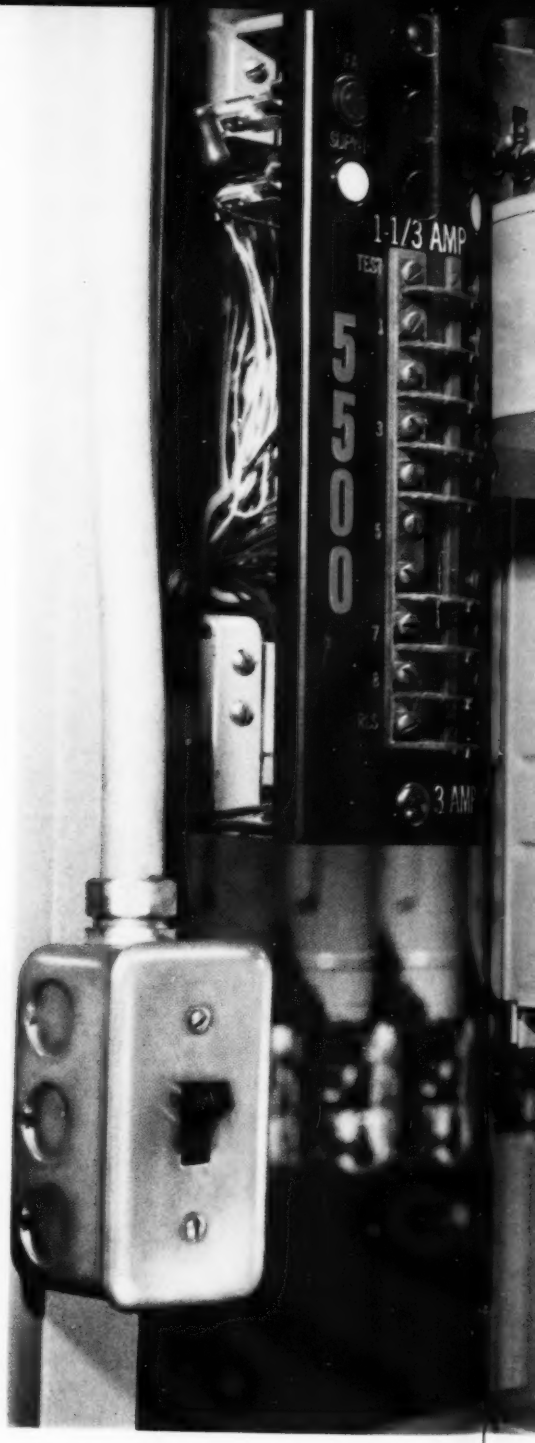

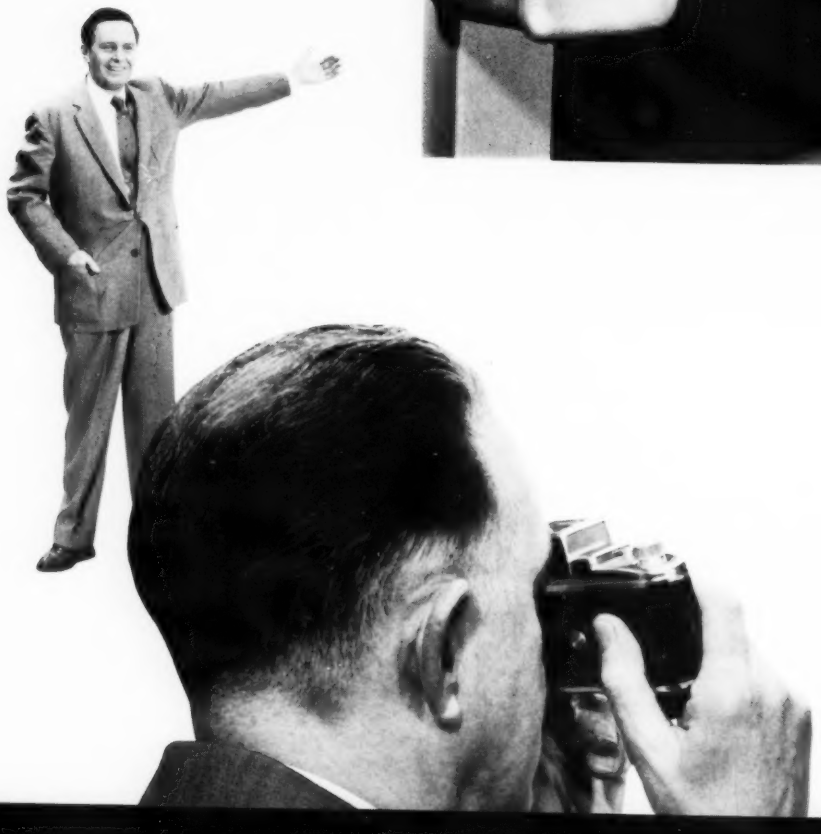

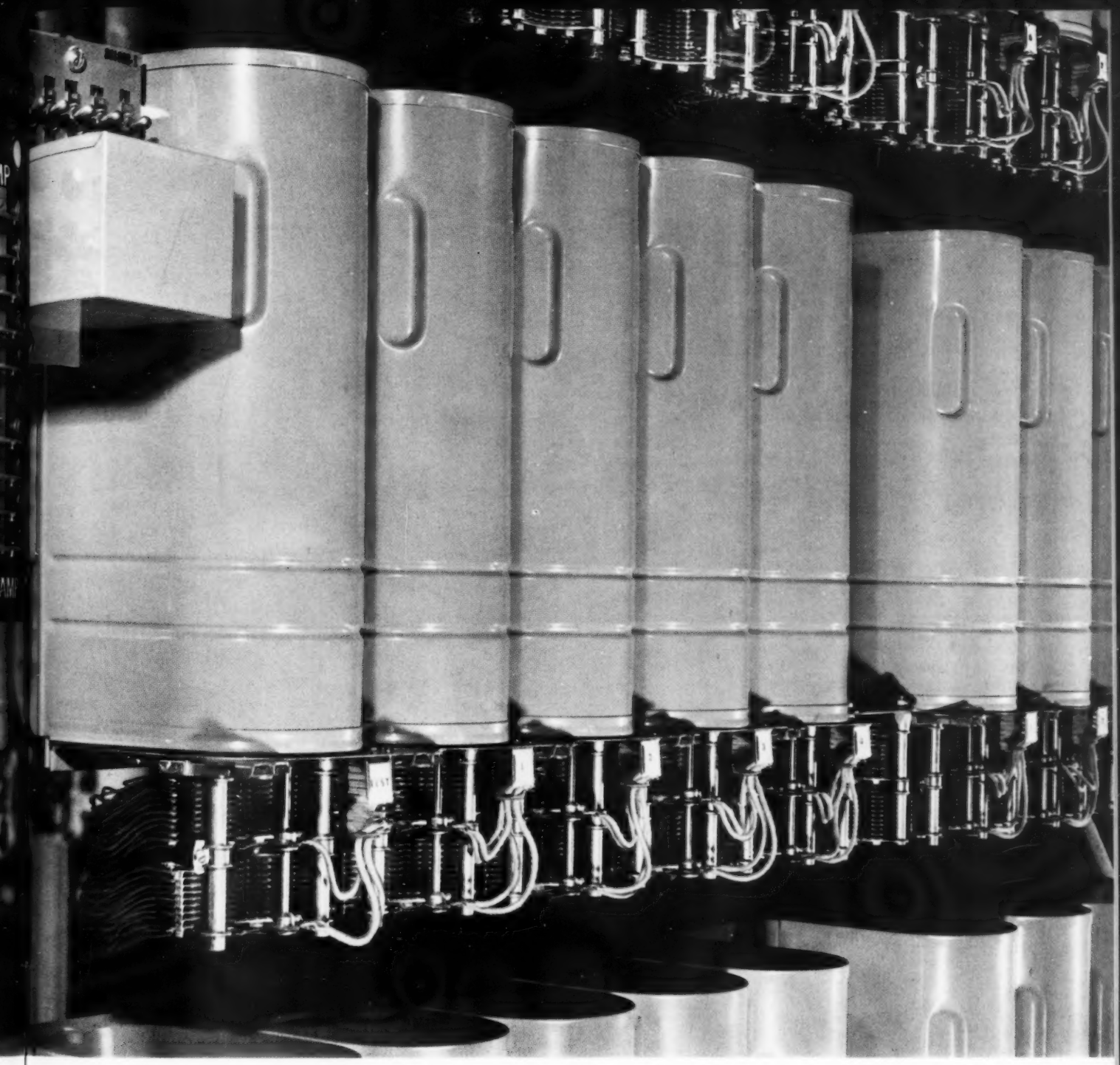

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AUTOMATIC ELECTRIC

A MEMBER OF THE GENERAL TELEPHONE SYSTEM

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Five Current Issues Feature Illinois Convention

By R. C. RENO

FIVE SUBJECTS that, today, are receiving primary attention of the entire telephone industry, were featured in addresses at the annual convention of the Illinois Telephone Association, held May 22 and 23 in Peoria.

These subjects have to do with the (1) increased demand for private line service and special uses of telephone facilities; (2) greater cooperation and understanding between state regulatory commissions and the telephone industry; (3) proper design, construction and maintenance of outside plant; (4) the coming of electronics to the telephone industry, and (5) expansion and extended area service.

The convention was presided over by Association President M. A. Kugler of Okawville.

The subject of special uses of communications facilities was covered in an address by B. W. Ford of Chicago, staff sales manager of Illinois Bell Telephone Co. He listed such businesses as power companies, pipe lines, air lines, government agencies, etc., as leading users of special services.

In emphasizing the increased demand for special uses of telephone facilities, Mr. Ford pointed out that from 1946 to 1956 Bell System gross revenues from private line service had increased from 49 million dollars to 198 million dollars. He emphasized that with the present trend toward decentralization of industry, Independent companies are bound to be asked to participate in this business. Stating that private line and special use services may soon become the major use of telephone facilities, he urged Independent companies to give consideration to providing these types of facilities.

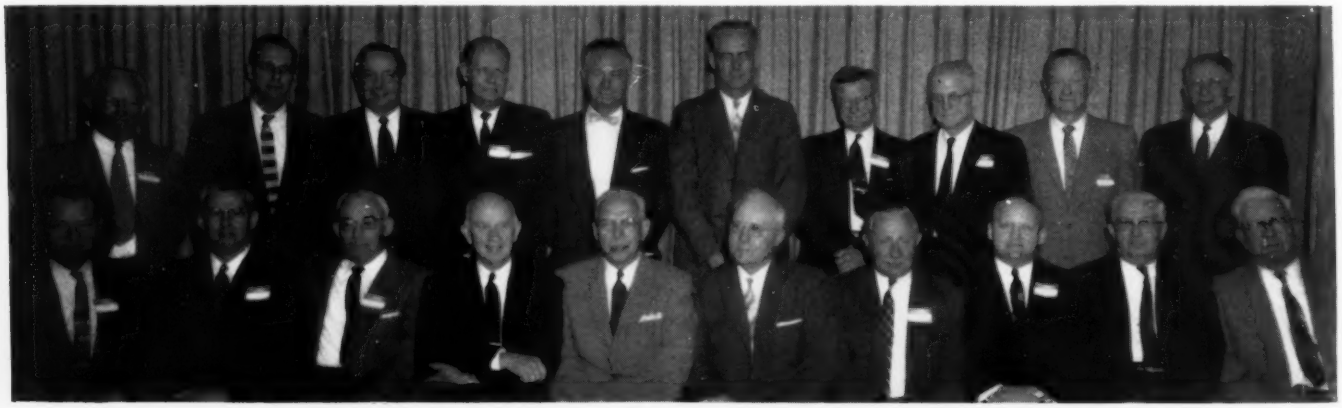
Mr. Ford's address was published in full in the June 8 issue of TELEPHONY.

R. B. Thomas, chief engineer of the Illinois Commerce Commission, stated that members of the Illinois commission, and its staff, try constantly to get the greatest possible understanding of the problems facing the telephone industry. He stated that the commission people realize that they cannot, by choice, be on any one "side of the fence" and that they do not regard their function as that of restrictive regulation. He pointed out that the commission's conception of "fence sitting" is one that finds it on cooperative and friendly terms with both the utility and the user, working with both sides to safeguard the benefits of free enterprise to each.

Mr. Thomas discussed certain problems of the telephone industry which have come to the attention of the Illinois commission, and he made suggestions as to how these problems can be overcome.

The full text of Mr. Thomas' address appeared in the June 22 issue of TELEPHONY.

"Outside Plant — Engineering, Construction and Maintenance" was the subject of an address by W. M. Driggs



Officers and directors of the Illinois Telephone Association. Seated, left to right: K. L. Schroeder of Freeport; Russell Logue of Casey; C. F. Melick of Eureka; R. A. Lumpkin of Mattoon; H. A. Barnhart of Rochester, Ind. (guest); Roland Schmidt of St. Jacob; B. W. Saunders of Springfield; Daniel Schaefer of Sycamore; J. G. Hardy of Springfield, and J. I. Kennedy of Freeport (guest). Standing, left to right: H. W. Pike of Springfield (guest); R. C. Ross of Springfield; W. R. McGrew of Park Ridge; M. A. Kugler of Okawville; A. T. Renn of Chicago; Don Anderson of Geneseo; Walter Dakin of Madison, Wis.; Ben B. Boynton of Springfield; Gordon Aller of Chicago, and Donaldson Coombes of St. Louis, Mo.

LEFT PHOTO: H. A. Barnhart (left) vice president of the United States Independent Telephone Association; M. A. Kugler (center) of Okawville, Ill. and R. A. Lumpkin, of Mattoon, Ill., discuss the 60th anniversary of the USITA during the Illinois convention. RIGHT PHOTO: A. O. Logue (left) of Casey; R. B. Thomas (center), chief engineer of the Illinois Commerce Commission and W. M. Driggs, engineering director of General Telephone Corp., get together at Illinois convention.

of New York City, engineering director of General Telephone Service Corp.

Mr. Driggs divided the plant department's function into three major categories, namely:

(1) To design the outside plant, providing adequate, dependable service at a reasonable cost.

(2) To properly construct the plant —taking full advantage of improvements in techniques, materials and tools.

(3) To effectively maintain the plant—to insure dependable and satisfactory operation of plant facilities.

"Probably the most important of these is the design of the plant—and I use the word 'design' quite broadly. It includes the over-all functions of engineering, whether it be future planning, basic design, engineering principles, economics and/or a number of other related engineering responsibilities," Mr. Driggs said. He continued:

"Let us review for a moment—future planning. This is often known as fundamental or long-range planning and should be a *must* in your operations.

"The success or failure of your operations could easily be dependent upon the judgment used in planning for the future. This is, therefore, important to each of you—whether you operate a large company or a small company.

"Some of you will now get ahead of me and say to yourself—I cannot spend now for something I will not need for several years. I do not suggest spending today for a gain in the 1970's, but I do sincerely recommend that you *plan* for the 1970's, then design today's plant to fit into that plan.

Concerning the importance of proper planning of outside plant, Mr. Driggs said:

"Why do I make such an issue of proper planning? During the last 10 years I have engineered projects, I have supervised engineering projects, and I have acted on the part of management on over-all plant and general problems. During this period I have observed the engineering work and projects in a number of companies, and I would make a very conservative estimate that a savings of at least 10 to 15 per cent could be realized by good, sound planning.

"During 1956, Independent companies added over 300 million dollars to their plant investment. If we could have realized as small a savings as 5 per cent due to good planning, we would have saved the annual charges on 15 million dollars.

"This amount of savings justifies a lot of serious thinking and I earnestly recommend that you add good planning to your outside plant program. Sound planning—in addition to a probable savings in dollars—will:

"(1) Provide you with adequate facilities when needed.

"(2) Improve the grade of service you render.

Raymond Spaniol (left) and John Gaspardo, president and treasurer, respectively, of the Cornell (Ill.) Community Telephone Co. attended the Illinois convention.

"(3) Increase the stability of your financial position.

"(4) Improve the relationship between your company and your subscribers, your company and your investors, and your company and your state commission."

Mr. Driggs emphasized the need of all telephone plant people to keep abreast of present day advancements and techniques and improvements in materials and tools. He listed some of these advancements as follows:

(1) Buried wire and cable.
(2) Front-mounted derricks and diggers.
(3) One-man splicing crew.
(4) Fuseless protectors.
(5) Stapling machines.

The coming of electronics to the telephone business was discussed by R. R. Dobbin of Rochester, N. Y., chief engineer, telecommunications division of Stromberg-Carlson Co. While most of his comments were devoted to electronic switching, Mr. Dobbin had the following to say about the introduction of electronics in the telephone field:

"The signs are evident that the telephone industry is entering into the era of full-fledged use of electronics. Comparing it to a new marriage; the courting days are over, the honeymoon is almost over and now the time of day to day partnership relation is starting where heartaches, headaches and plain hard work are indicated with the attendant benefits which result from a compatible relationship.

"As you all recognize, electronic equipment has been with us in the form of carrier equipment, multiplexing equipment, two-wire, four-wire and negative impedance repeaters and microwave r-f links. Many of you have men on your staff who are familiar with this gear. I feel that the full entrance of the industry into the electronic area occurs when the electronic switching systems start to be used. The immediate future will see this."

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LEFT PHOTO: In this group photographed in Peoria, are, left to right: A. D. Hunter of Marseilles; P. D. Woodward of Chicago; Ed Melcher, telephone engineer of Illinois Commerce Commission, and Oscar Krick of Millstadt. RIGHT PHOTO: This fivesome from the Ashland Telephone Co., are, left to right: Helen Page, Robert Hager, Gladys Hager, Carl Hager and Rosella Jones.

Mr. Dobbin said that those companies which want to be prepared for the coming things should gradually get their switching and maintenance personnel schooled in electronics. In closing, Mr. Dobbin stated:

"The important thing to bear in mind is that this industry is changing rapidly. Communication requirements are increasing every day. The requirements for faster service and more paths of service are growing so fast that new methods of accomplishing these results must be found. The telephone company which is going to grow is the one which can quickly adapt to its customers' changing requirements. New services will be developed and demanded. Electronics and electronic switching will have a large part in providing these larger requirements and these new services. Your company can be ready by providing for the use of these newer products as they appear. You will not use them altogether overnight. However, tomorrow always comes sooner than we realize. The smart company will recognize its tomorrow in today's operations.

"Summarizing, the speed of operation, adaptability, small size and low power drain of such devices as transistors and magnetic cores make the future of electronic switching devices important in your future operations."

"Our experience indicates that customers have welcomed the introduction of extended area service and are well pleased with it after it has been established. I know of no instance where full extended area service has been discontinued once the offering has been made," J. N. Elliott of Chicago, acting general rate engineer of Illinois Bell Telephone Co., told the convention, in a talk on "Extended Area Service." Telephone companies are working hard to provide their customers with the most adequate service they can. Service becomes more adequate as local calling areas are enlarged and the restrictive influence of the toll charge is removed, he said.

Mr. Elliott listed a few of the more favorable aspects of extended area service as (1) the usage of the telephone service increases substantially; (2) greater incoming use of service is made available as well as more outgoing use; (3) even though the basic monthly rates for local service are higher, customers seem to be best satisfied when they can call all the points with which they have frequent business and social contacts without having to pay a separate toll charge for each call; (4) customers like to know in advance the approximate amount of their bill; (5) possibility of greater telephone development. He continued:

"Once there is some evidence of a definite community of interest between two or more exchanges, careful consideration must be given to all of the interests which would be affected by offering service on this basis. Here are some of the more important factors to be taken into account in reaching a decision as to whether to offer extended area service:

"(1) Message usage between the exchanges involved—over-all calling volumes between exchanges can be determined from a count of toll tickets; (2) customers expressed desires for extended area service; through newspaper stories and editorials, the activities of civic organizations, or complaints or inquiries from customers; (3) customer opinion surveys—personal contacts elicited the most favorable responses; (4) economic relationships between the communities involved; (5) common school districts; (6) opinions of local telephone people; (7) revenue effects; (8) rate levels; (9) cost effects. The last three effects are closely tied together and should be considered collectively as well as individually.

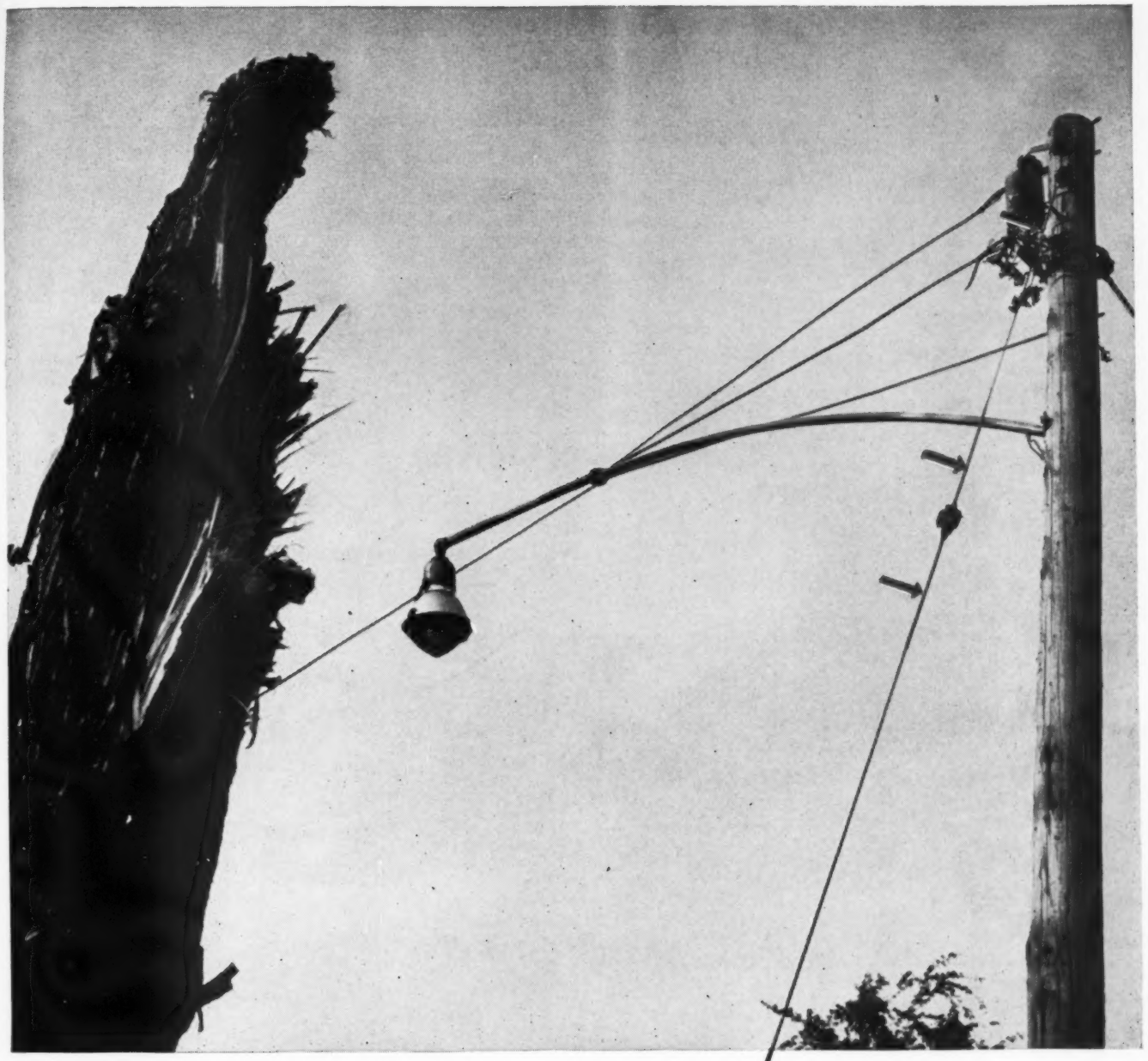
"With extended area service there will be a temporary or partial reduction in toll revenues, and one method of offsetting this reduction is to set higher monthly rates. The offering of extended area service affects the cost of operations. The cost effects are the net result of two principal factors working in opposite directions; on the one hand the elimination of the operating expense involved in handling each individual call on a toll basis and on the other hand the additional circuits and switching facilities to handle the increased volume of calling due to the stimulation in traffic which results when customers can call toll-free.

"Whatever the net cost effect is, it will be combined with the net effect on revenues in determining the practicability of the particular extended area plan under consideration. Experience shows that generally customers are willing to pay well for value received in telephone service. We place a high value on good customer relations, and we try hard to improve them. I sincerely believe that we buy a lot in good will from the public when we are able to introduce an extended area calling plan."

In his annual report, Association Secretary J. G. Hardy traced the growth of telephone stations, conversions to automatic operation, and the reduction in the number of telephone companies in the state as a result of mergers and consolidations. On these subjects he reported:

"In 1928, there were in Illinois 542 telephone companies operating 1,096 exchanges serving 1,771,767 stations. In 1930, the beginning of the depression, we started to lose stations, and in 1933 there were 429 companies serving 1,475,414 stations. In the five-year period from 1928 to 1933, there was a loss of 296,333 telephones. In 1934, there was a small gain in stations and from that year on the growth was steady. By 1946, the gain was from 200,000 to 300,000 stations each year, but the number of companies continued about the same. As of Dec. 31, 1956, there were 301 telephone companies operating 1,018 exchanges and serving 4,086,246 stations. Of this number, Bell companies were serving 3,458,-

XUM



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PX – 77

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475 and Independent companies were serving 627,771 stations.

"Independent companies have converted 297 exchanges to automatic, serving 324,121 stations. The two Bell companies have converted 165 exchanges to automatic serving 3,017,978 stations, making a total of dial stations, both Bell and Independent of 3,342,099, or a gain in stations from 1933 to 1956 of 177 per cent."

Mr. Hardy gave credit to the association's Small Company Committee for helping bring about the improvement in the industry in Illinois. He reported that representatives of the committee visited 155 telephone companies in the past year. They aided these companies in bringing about reorganizations, securing outside financing, preparing rate increase cases, and effecting improvements in plant, accounting and general operating practices.

Hugh A. Barnhart, president of the Rochester (Ind.) Telephone Co., and second vice president of the United States Independent Telephone Association, represented the national association on the Illinois convention program.

"Since the early days of telephony the Independents collectively have steadily acquired stature, operating vigor, and financial stability until today there are in the United States and its territories some 4,400 Independent telephone companies serving more than 9,000,000 telephones in some 11,000 communities. These companies today represent an investment of nearly 2.5 billion dollars, have annual gross revenues of approximately 650 million dollars, and handle more than 40 million local and long distance calls every 24 hours," Mr. Barnhart said. He continued:

"The stalwart and thriving Independent industry owes its progress, its strength, and its vitality to many things. Not the least of these is its allegiance and its adherence for threescore years to its national trade organization—the United States Independent Telephone Association—which has promoted, guarded, and developed the interests of the Independent segment of the industry during most of its remarkable lifetime.

"This year one of our foremost activities will be the celebration of the association's 60th birthday in which we cordially invite every telephone company and every telephone association in these United States and its territories to take an active part. On May 1, a suitable proclamation was issued by USITA President Power designating the week of Sept. 8 as 'Independent Telephone Week.' Wide publicity has been and will be given to the observance, which offers splendid tie-in opportunities to all units of Independent telephony, including operating companies, manufacturers, suppliers and related firms, state telephone associations, and Pioneer groups.

"Members of our board of directors and state association secretaries have been requested to ask their respective governors to issue proclamations setting aside the week of Sept. 8, as 'Independent Telephone Week.' At the same time, we urge that all Independent telephone people give such effective aid and assistance as they can in an all-out effort to make our 60th Anniversary celebration a successful one.

"Many non-member companies recently have indicated they plan to affiliate as direct dues-paying members of our national association as their contribution to the anniversary observance and so that they may participate in next October's Chicago convention when the anniversary celebration will reach a grand finale."

The featured out-of-industry convention speaker was Paul Harvey, noted ABC news commentator, who addressed the convention on "The U. S. A. Twenty Years From Today."

The following directors were re-elected by the convention: Gordon Aller of Chicago; Russell Logue of Casey; C. F. Melick of Eureka; Daniel Schaefer of Sycamore, and Roland Schmidt of St. Joseph.

Other directors are: R. J. Alter of Galesburg; Don Anderson of Geneseo; Donaldson Coombes of St. Louis; Walter Dakin of Madison, Wis.; W. C. Drysdale of Rantoul; M. A. Kugler of Okawville; R. A. Lumpkin of Mattoon; W. R. McGrew of Park Ridge; A. T. Renn of Chicago; R. C. Ross of Springfield; B. W. Saunders of Springfield and K. L. Schroeder of Freeport.

The directors elected the following officers: President, Mr. McGrew; vice president, Mr. Schroeder; treasurer, Mr. Alter; secretary, J. C. Hardy, and general counsel, Ben B. Boynton of Springfield.

USE OF THE OSCILLOSCOPE

Continued from page 23

and properly terminated in matching apparatus, this kind of a figure will result, and it will remain fairly constant as the oscillator is rotated through the frequency range (such as 200 to 3,000 cycles), which the pair is expected to handle. If the pair is improperly matched or loaded, a dramatically different pattern results.

As the oscillator is turned through the frequency range, the image on the "scope" changes from a line to a loop and back again; it straightens up and lies down and seems to bounce around like a barrel hoop.

Actually, the slope and shape at any one position could be measured and the phase angle determined. A great deal can be learned with Lissajous figures. No attempt to evaluate the findings in this experiment was made; it seemed to be a big advantage even to be able to quickly tell if a line were correctly loaded and matched or not by one twist of the oscillator dial. It was decided to leave further exploration along these lines to a future project covering the whole subject of transmission.

Among the references consulted in preparing these articles were the following:

Instruction manual for Hickok Model 770 Oscilloscope. Also "The Oscillograph," by Walter Weiss. Published by the Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland 8, O.

"How to Service Radios with an Oscilloscope." Published by Sylvania Electric Products, Inc., 500 Fifth Ave., New York 18, N. Y.

Instruction manuals and "A New Angle on Phase Measurements," by G. E. Bauder. Published by Tektronix, Inc., P. O. Box 831, Portland 7, Ore.

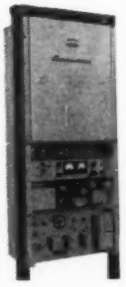
"The Cornell-Dubilier Capacitor." Published by Cornell-Dubilier Electric Corp., Hamilton Blvd., South Plainfield, N. J. Several past issues of this publication contained methods of using the cathode ray oscilloscope. This magazine is sent free of charge to radio men and other users of C-D products. You can get on the mailing list by writing to the editor of the C-D capacitor at the South Plainfield address.

"Encyclopedia of the Cathode Ray Oscilloscope." Published by John F. Rider Publisher, Inc. This volume of over 900 pages covers industrial as well as radio and television use of the oscilloscope. It is presently out of print, but John Rider has promised a new edition some time this year. When it is available, TELEPHONY will review it.

"Obtaining and Interpreting Test Scope Traces," by John F. Rider. Anyone who uses an oscilloscope should have this book. As with other Rider books, this is aimed at the man who must work with the equipment, as well as the engineer. It is tersely written but easily understood. No words are wasted on the theory of the instrument. The book is a study of the wave form. About 50 pages of its 184 pages are devoted to the form of waves, their composition and variations.

The early chapters of the book are patient in their explanations of the basic things that go into making up a wave shape. They show that all waves

NEW



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derive from sine waves, then they go on to explain how even square shaped waves are built up from a number of harmonics. Although wave form can be analyzed mathematically, this text prefers the illustrated approach. Hundreds of diagrams and photographs of actual "scope" traces are shown in order to demonstrate how complex waves are created and what they mean.

Other chapters in the book discuss amplitude modulation wave envelopes, and response curves. Most useful to a beginner are chapters on manipulation of "scope" controls and interpretation of "scope" traces. Concluding chapters show an assortment of Lissajous figures and their significance, and a group of different hook-ups for oscilloscopes in order to present different kinds of displays.

Much of the material relates specifically to radio and television, but the book is by no means limited to these fields. Much of the wave analysis material would apply to wave forms in carrier or voice telephone lines as well as to radio. This is because high or low frequency response, distortion, etc., shows up with the same characteristics on wave forms, regardless of the apparatus being tested. This book was referred to constantly in the experiments mentioned in the foregoing series of articles and was found to be an inspiration for many of the tests made.

This book may be purchased from TELEPHONY.

The Wages of Speeding

Speeding was blamed for 13,830 deaths on U. S. highways in 1956.

Operators at Ala. Prison Perform Unusual Duties

by Jesse O. Jones

The two best-protected telephone operators in the state of Alabama work atop a 40-foot concrete tower in front of Kilby Prison, near Montgomery, Ala. A quarter-inch of steel armor shields the lower section of the edifice.

Surrounded by a maze of telephone switchboards and radio equipment, Mildred Best and Mary Butler are often called upon to perform duties the average telephone operator never heard of.

Not long ago Mildred received a frantic call from a lady.

"I just saw five prisoners escaping," she gasped. "I don't know where they are now, but I saw them running toward the woods at the back of the reservation."

In a second the intricate prison communications system was humming. Before a fast-running man could cover 100 yards, Mildred knew what the real score was.

Five trusties, working on an irrigation project, had run to the edge of the reservation and stopped. But the badly frightened lady hadn't waited to see the outcome; she fled to a telephone and called the main switchboard at the penitentiary.

Mildred's response was rapid. While continuing to process regular telephone calls, she set routine escape procedure in motion. It was her job to find out the "escaping" prisoners' names, get an accurate physical description and judge which of the various law enforcement agencies she should first notify.

An error in judgment here with a consequent loss of a few minutes could mean the difference between catching the men and not.

As it turned out, there was no cause for alarm. The men in question had jumped a rabbit and run him to the edge of the reservation, where they stopped.

Mildred, the first-trick switchboard operator, keeps in contact with the highway patrol car assigned to the Kilby area and sends him winging in a hurry toward trouble spots on the big reservation. But sometimes she can get a quicker action by notifying city or county police. It's her decision, and she doesn't have time to ponder it—she must act.

Handling escape procedure, however, is a minor part of these operators' unusual duties.

For one thing, they must trace calls from persons who refuse to identify themselves, and screen outgoing calls.

"There'll be no escape rendezvous made through my switchboard," Mildred says, and the possibility does seem remote. For should a prisoner manage to get to a telephone his call would go no further than the board. The two operators recognize the voice of every official in the prison and a strange voice brings a quick query.

Automobiles that stop over-long in front of the prison are also suspect, and a patrol car soon will pull alongside to investigate. Both girls are friendly and courteous, but they realize their domain is the nerve center of a maximum-custody prison, and they don't take anything for granted.

Their policy is to investigate first—apologize later.

Mildred F. Best (left) and Mary F. Butler, operators at Kilby Prison, near Montgomery, Ala.

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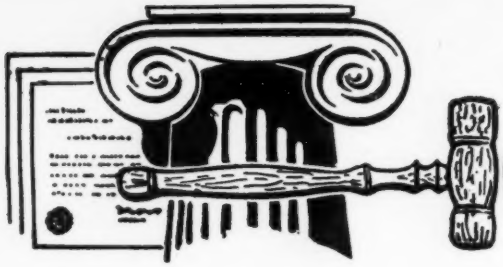

Courts and Commissions

Second Original Cost Bill Turned Down in New York

Failing of enactment in a special session of the New York State Legislature, recently adjourned, was a bill which would have permitted the New York Public Service Commission to regulate telephone and railroad rates on the same basis as such other public utilities as gas and electric companies, using capital actually invested or original cost as the rate base, instead of replacement value (TELEPHONY, April 13, p. 35).

A similar bill as that killed in the special session was repealed earlier during the 1957 regular state legislative session. Governor Harriman called the special session to again consider the bill.

The state court of appeals last year interpreted a 45-year-old state law as requiring the commission to consider reproduction cost in setting telephone and railroad rates. New York Telephone is currently seeking a rate raise on the basis of the new formula ordered by the court.

Two Minnesota Companies Given Authority to Buy

The Minnesota Railroad & Warehouse Commission on June 10 authorized the Northwestern Bell Telephone Co. to purchase property of the Germantown Mutual Telephone Co., a cooperative, located in the vicinity of Thief River Falls and switched from the Thief River Falls Exchange of the Northwestern Bell company. The property serves some 25 customers.

The commission on June 23 gave the Bertha Telephone Co. permission to purchase the entire property of the Bertha Southwestern Telephone Co., consisting of about 40 stations.

Six Ind. Companies Owned By Hosea Approved for Sale

Six of the 13 rural Indiana telephone companies owned by Max E. Hosea were approved for sale on June 19 by Federal Judge William E. Steckler, it was reported (TELEPHONY, Jan. 7, 1956, p. 38).

The six, located at Hymera, Greene County, Goldsmith, Sharpsville, Lizton and Griffin, will be purchased by the Smithville Telephone Corp. at Ellettsville for $115,000, under the court's ruling.

Recommendation for the sale was made by James L. Beattey, Indianapolis attorney named receiver to handle the business dealings of the run-down companies operated by Mr. Hosea and his wife.

The owner and his wife, and their 13 companies were named defendants in a $149,072 civil suit filed by the government in December 1955, charging them with failing to collect and withhold $104,204 in excise taxes.

The case, after months of arguments and various attempts at settlement, is expected to go to trial within a few months.

Tennessee Independent Gains Increase in Rates

Higher rates approved by the Tennessee Public Service Commission for the Halls Telephone Co. went into effect on June 1, company officials said (TELEPHONY, Jan. 19, p. 34).

Here is a breakdown of the old and the new rates:

Residence—one-party, $4.95 to $5.84; two-party, $3.85 to $4.59; four-party and eight-party, $3.30 to $3.99.

Business—one-party, $11.85 to $13.74; two-party, $9.65 to $11.39; four-party, $8.00 to $9.49; eight-party, $6.00 to $7.24.

Convert N. C. Mutual

Conversion of the Guilford Telephone Co., Guilford College, from a mutual telephone company to a public utility was approved on June 21 by the North Carolina Utilities Commission (TELEPHONY, Jan. 19, p. 42).

Tenn. Rate Raise Denied

The Tennessee Public Service Commission has denied the request of the Powell Telephone Co., for a general rate increase, it was reported on May 30 (TELEPHONY, Feb. 2, p. 30).

Two Missouri Companies Request Financing

The Missouri Public Service Commission on June 18 received the application of the Hartville Telephone Co., to issue 300 shares of 6 per cent noncumulative preferred stock of a par value of $50 per share. The company at the same time applied for authority to issue its mortgage notes to the REA in a total sum not to exceed $246,000.

The commission on June 19 received the application of the Fidelity Telephone Co. to issue its mortgage and notes to Stromberg-Carlson for $400,000, and for another loan of $300,000.

Ohio Commission Proceeds On Two Rate Applications

The Ohio Public Utilities Commission has recently completed its engineering and accounting investigation of the application for rate adjustment of the Lykens (O.) Telephone Co.

The engineering department of the commission started with the value determined from an inventory and appraisal made as of June 23, 1953, which was adjusted by the value of additions added to the property subsequent to June 30, 1953. The adjusted reproduction cost new valuation amounted to $56,293.93, to which was applied depreciation in the amount of $20,465.37, which allowed for a present value and rate base of $35,828.26. The accounting report of the commission shows that the anticipated revenues will yield a return of $2,073.51, which amounts to a rate of return on the rate base of 5.79 per cent.

The Lykens company renders service through one exchange to approximately 170 subscribers.

•

The same procedure was followed in the commission's investigation of the Van Buren (O.) Mutual Telephone Co., as outlined above.

The previous inventory and appraisal made Nov. 30, 1953, was adjusted to the date certain of the rate case and found to be a reproduction cost new valuation of $65,599.06 and the depreciation of $23,371.00 resulted in a

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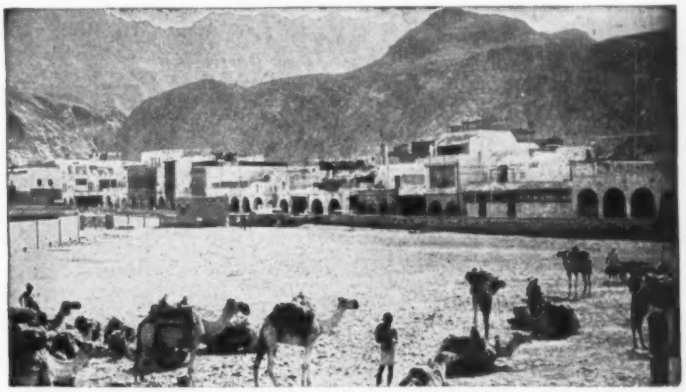
The following types of BICC Cable are in continuous manufacture for telephone administrations in many countries: coaxial and balanced pair cables for carrier working, long-distance audio cables, paper or polythene insulated exchange-area distribution cables.

We shall be pleased to give you further information from our nearest Branch Office or from our Headquarters in London.

AUSTRALIA *Electrification of the New South Wales Railway Western Line has necessitated a completely new track-side cable scheme covering the 34 miles from Sydney to Penrith. The main cable comprises 6 pairs for 24 channel carrier working and 60 audio pairs for local telephone and control purposes. Many of the audio pairs are terminated at railway stations, signal huts, power substations, etc., in order to provide local facilities. The installation was undertaken by BIC Construction Co. for the N.S.W. Railways Department, the cable being manufactured by BICC.*

NEW ZEALAND *BICC have supplied a long-distance cable between Auckland and Hamilton for the New Zealand Post and Telegraph Department. BIC Construction Co. supervised the installation and undertook the progress and transmission testing. The cable consists of 4 coaxial tubes to provide long-distance carrier or television circuits, together with a surrounding layer of 54 audio pairs for intermediate local circuits. The pairs are loaded. The cable is buried direct in the ground for most of its eighty-mile route, except when passing through towns where it is laid in ducts.*

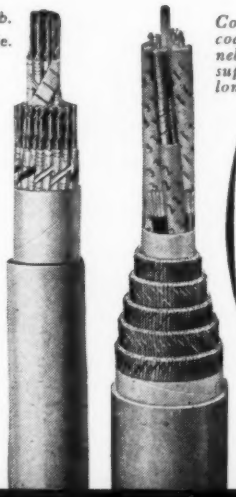
VENEZUELA *BIC Construction Co. have undertaken the jointing and supervision of installation of a 448 pair 20 lb. long-distance audio cable to improve the telephone service between Caracas and Maiquetia. With a route length of approximately seventeen miles, the cable runs wholly in ducts along the side of a newly-constructed auto-road linking the capital town of Caracas with the coast. This contract has been undertaken for the Compania Anonima Nacional Telefonos de Venezuela, the cable being manufactured by BICC.*



ADEN *To extend existing facilities and to cater for the Colony's growth, a new distribution network has been installed comprising approximately 44 miles of BICC cables specially protected against soil corrosion. The new network provides an increase of 3,000 lines and consists of paper-insulated local distribution cables ranging from 15 to 200 pairs, the larger sizes being of the unit twin type. A short balanced and loaded audio cable was also installed to link the Town with the new refinery site at Little Aden. This contract was undertaken for the Aden Posts and Telegraph Department.*

Left: a BICC jointer at work on a coaxial cable, cutting the tubes ready for jointing. Two typical cables for carrier working are illustrated on right.

BICC manufacture every type of telecommunication cable and undertake their installation—anywhere.



24 channel 24 pair 40 lb. carrier telephone cable.

Composite cable with 4 coaxial tubes for 960-channel or television, with 18 supervisory pairs and 390 long-distance audio pairs.

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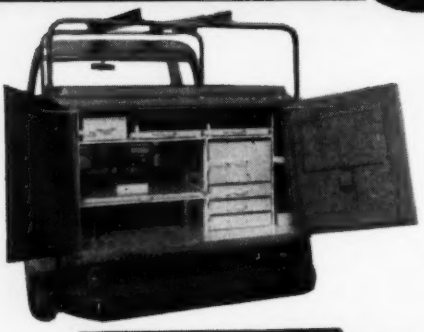

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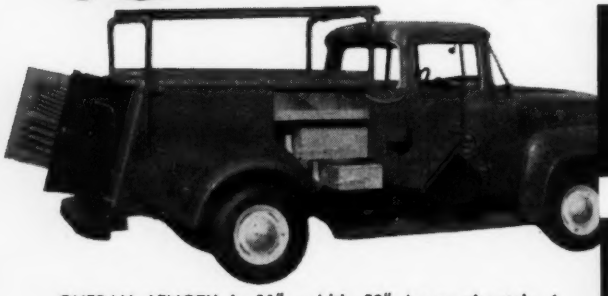
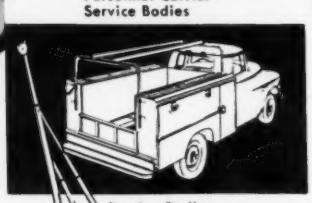
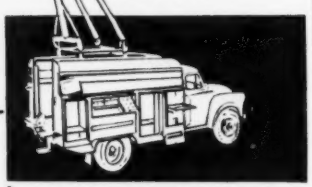


OVERALL LENGTH is 81", width 58" (approximately 6 feet across fenders). Length at top, 72¼", length at floor line, 79¼". Body designed for installation on any standard chassis with a 38" to 42" cab-to-rear-axle dimension. Space provided for either 4-foot or 6-foot ladders as specified and for all normal telephone installation and maintenance equipment—apparatus, directories, pay-out reel, wire, belts and materials. Spare tire is carried on special sliding tray in left-hand compartment.

Personnel Carrier Service Bodies



Service Bodies



Line Construction Service Bodies & Hydraulic Derricks

UTILITY BODY COMPANY
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Please send price and delivery information on Series 1-40 Installers Body. I would also like information on:

☐ Personnel Carrier Service Bodies ☐ Service Bodies ☐ Line Construction Service Bodies & Hydraulic Derricks

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present value or rate base of $42,228.06. The income available for fixed charges amounts to $961.60, which shows a rate of return of 2.98 per cent.

It is reported that many Ohio companies being mutually operated are not desirous of making a rate of return that is as high as that usually allowed by the commission and only care to make a return slightly higher than the actual amount necessary to carry them through.

The Van Buren renders service through one exchange to approximately 250 subscribers.

Pacific T&T JA Groups Sets National Sales Record

Tel-A-Pen Co. of San Diego, Cal., a Junior Achievement company sponsored by Pacific Telephone & Telegraph Co. employes, this year set a national JA record for gross sales.

The teen-managed corporation started with $350 from the sale of stock, and wound up with a $20,000 business in the manufacture and sale of unique bantam telephone desk pen sets.

After splitting their stock two for one in February, the group closed out their year with a 20 per cent dividend, paying investors $6.00 on an original $2.50 investment.

At the San Diego JA annual award dinner in May, Tel-A-Pen won a first place in national competition, the National Industry Award. One such award is given in each JA chapter.

In addition, two Tel-A-Pen student officers won scholarships. They are President Martha Landon, $2,000, and Treasurer JoAnn Ransdell, $300. Both girls attend Chula Vista High School.

Tel-A-Pen Co., in turn donated $2,900 to San Diego Junior Achievement.

Pacific Telephone advisors to Tel-A-Pen are: Art Kluge (commercial), sales advisor; Harold Lewis (plant), production advisor, and Bill Parker (commercial), business advisor.

N. C. Telephone Man Named

Linn D. Garibaldi, manager of the North Carolina Telephone Co., Matthews, has been appointed by Governor Luther H. Hodges of North Carolina to serve as a member of the newly-formed North Carolina State Prisons Commission, which will be in charge of operating the state's prison system.

Oregon Company to Purchase

The Oregon Public Utility Commissioner on June 18 extended permission to the Valley Telephone Co. to purchase the Santiam Cooperative Telephone Co.

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STAINLESS STEEL

In developing a new line of drop wire clamps, Reliable has passed-up aluminum wedges and shims and is producing STAINLESS STEEL clamps. Even the most economical one is all stainless except the aluminum shell.

A choice of eight clamps gives you the size and combination best suited to your drop wire and your locality.

Substantial savings are passed on to the owners of the telephone plant.

Reliable's latest catalog sheets make your choice easy and assure the best possible clamp on your drops.

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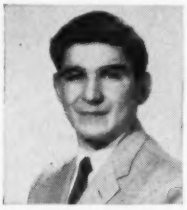
Published regularly to help you get the most out of your materials and supplies dollar



by Frank R. Kasper, Inside Sales—Atlanta

At our house, we have a dynamo of atomic automation—she's just under 2 years old and keeping up with her is a big job—but fun. It's just the same keeping up with your needs for supplies: big job—but fun. It's satisfying work to know the parts and equipment I send you—are finest in the world. Why am I so sure they're best? Because they come to you with a double guarantee—the maker's . . . and Stromberg-Carlson's. And along with the protection you get from Stromberg-Carlson's 62-year reputation—you get the promise of new and better telephone equipment from the research program your orders help support. Thanks for the mighty fine business you've given us—we sincerely appreciate it!

Protect telephones from lightning

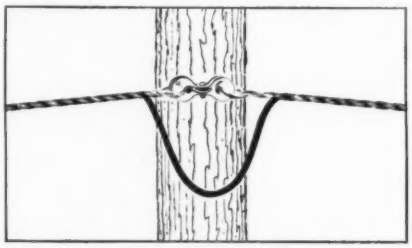
No larger than a good-size candy bar is the Cook 09u telephone protector shown here. But it can save you a lot of grief and you can protect single circuits, both indoor and out.

Individual circuits are protected by small unit, measuring 6¼" x 2¼" x 1¾".

The body is a single piece of heavy white glazed porcelain. Lightning arrestors are two Tru-Gap dischargers, two flat carbons mounted on a copper ground strip, and A-9u 7-amp. lavite fuses. Neoprene gasket locks out insects, dust, snow, etc.

Pressure is widely distributed

To provide an even, positive grip, Preformed Dead-Ends for Self-Supporting Plastic Cable are designed so that low radial pressure is distributed over a large area.



Available for 6, 11, 16 and 26 pair 19 AWG Self-Supporting Cable.

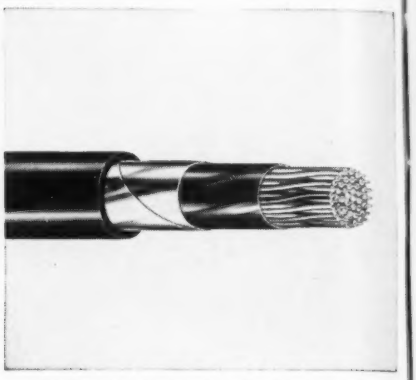
You have no high stress points to worry about, and no sharp bends in the cable are required. PLP Dead-Ends hold the full-rated strength of the Self-Supporting Cable and will not damage the outer covering or internal members.

You can easily apply these Dead-Ends by hand, without tools. Simply insert one leg through a standard hardware thimble clevis and wrap the legs around the cable.

Preformed Dead-Ends are specifically designed for safe use with plastic-covered multiple cable.

Gives maximum protection

This cable made by Ansonia Wire & Cable Company offers finer electrical characteristics than any other comparable cable.



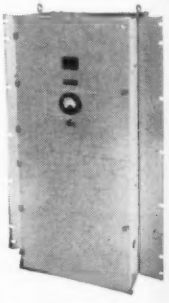
Available in 24, 22 and 19 gauge, 11 through 404 pair

To get maximum protection against moisture and weather, specify Ansonia Type 775-P Aerial and Duct Cable.

Its conductors are individually insulated with polyethylene and paired with systematically varying lays to eliminate cross-talk. The cable is shielded with aluminum tape and protected by a tough, plasticized polyvinyl chloride jacket.

Raytheon Rectricharger® Battery Chargers—Complete Line 3-400 Amperes

Entirely redesigned new Raytheon Rectichargers offer three major improvements:



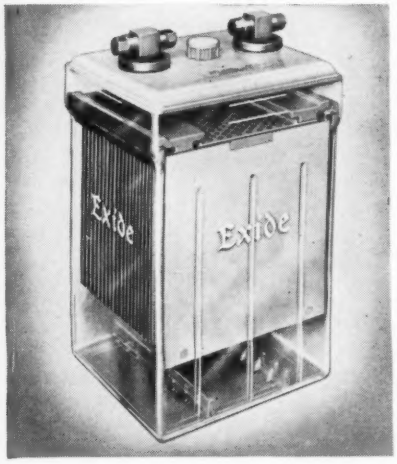
New Raytheon battery chargers feature ± 1% no-load to full-load regulation

1. ±1% no-load to full-load stabilization prevents battery overcharging, minimizes gassing, lengthens battery life.
2. No audible hum at output terminals.
3. Most compact units on the market—wall or rack mounted.

Automatically compensated for rectifier aging, Rectichargers offer high efficiency, completely automatic regulation. No moving parts and self-protecting circuitry assure minimum maintenance, long life. Single and three phase, 3-400 amps.

Battery life prolonged by strong plates.

The Exide-Tytex Battery is a flat plate type specially designed to give long life. In addition, it offers the advantages of high capacity in relatively small size. Hence it is preferred in many telephone applications.



One of the most important features of the Exide Tytex Battery is the construction of the positive plate. The exclusive, patented Silvium grid resists corrosion—prolongs battery life. Specially shaped horizontal grid bars lock the active material firmly to the plate while presenting only a minimum of exposed metal to the electrolyte. This also effectively shields the grid against corrosion and at the same time insures that every plate will have a maximum of active material in contact with the electrolyte—for higher capacity. Every fifth horizontal bar is 300% thicker in order to give the plates extra strength.

Molded plastic jars require considerably less space than needed by conventional cells. This makes it possible to put more battery capacity into a given amount of shelf area.

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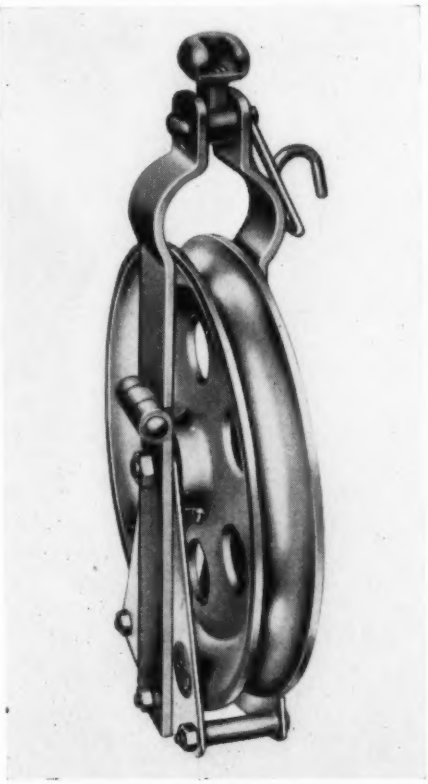
News on New Products

STRINGING SNATCH BLOCKS — To meet requirements of pole line contractors and utilities, Sherman & Reilly, Inc. has introduced new and time-saving stringing snatch blocks, known as their No. 73 series.

This series features widened throat



design which is ideal for reconductoring, where new conductor is pulled through as old conductor is pulled out. A widened throat provides trouble-free passage for connectors, compression joints, swivels and splices.

The S&R No. 73 series incorporates safety locking, and cannot open accidentally, the company says, but when a pin is rotated 90°, the block opens easily on a sturdy hinge.

The company lists the following additional advantages: Polished groove sheaves of high strength aluminum alloy, especially suited for stringing ACSR; forged steel socket connector; high strength with weight held to a minimum; mounted on two shielded ball bearings, fitted for Alemite lubrication; full length strap and three-point reinforced aluminum side plates which guard against damage in moving and handling, and a convenient hand line hook.

Five standard sizes are available, ranging from 7 inches x 1⅜ inches through 16 inches x 2⅛ inches, accommodating conductor ranging from .783 inch to 1.246 inches in diameter. The blocks can be obtained with a variety of forged steel fittings. Design modifications for specific applications can be made. Request NP686.

•

CONTINUITY TESTER FLASHLIGHT—A special, improved continuity flashlight has been introduced by the Ray-O-Vac Co.

The N22T continuity tester features a heavy-duty Ray-O-Vac Workman flashlight with special end cap and attachable tester. The tester is equipped with

(Please turn to page 54)

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Please have the manufacturer send me without obligation the literature indicated by the following numbers:

NP686_____; NP687_____; NP688_____; NP689_____;
NP690_____; NP691_____; NP692_____; NP693_____;
NP694_____; NP695_____; NP696_____; NP697_____;
NP698_____; NP699_____; NP700_____; NP701_____.

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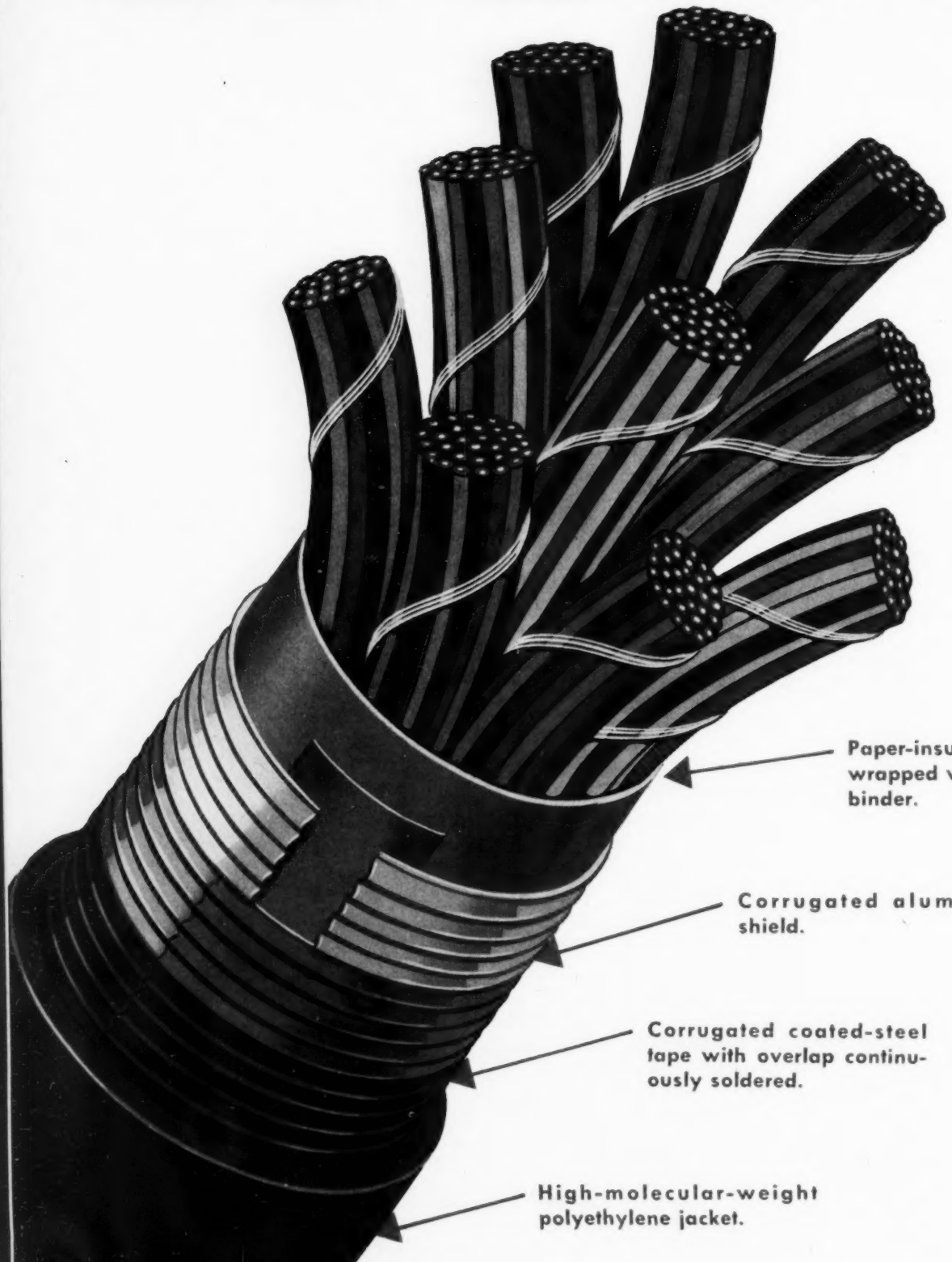
Paper-insulated conductors wrapped with a paper core binder.
Corrugated aluminum shield.
Corrugated coated-steel tape with overlap continuously soldered.
High-molecular-weight polyethylene jacket.

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YOU CAN BUY **STALPETH***

AUTOMATIC ELECTRIC

Unique sheath construction of this plastic cable gives you superior performance, greater economy

It's important news—General Cable's new Stalpeth exchange and toll cable! Stalpeth has all the protective qualities you want, without excessive weight. Combining a layer each of aluminum, steel and plastic over a paper-insulated core, Stalpeth handles easily—installs quickly and economically.

Here's how the sheath is made. First, a corrugated aluminum shielding tape is applied longitudinally over the paper-insulated core. Then, a corrugated coated-steel tape is also applied longitudinally, *with the overlap continuously soldered.* Finally, an extruded, high-molecular-weight polyethylene jacket is plastic-cemented to the steel. Here's moisture-and-corrosion-resistant protection that will last and last.

In aerial installations, Stalpeth saves you money because you can use lighter messenger strands, longer spans and fewer poles. In ground installations, Stalpeth's high-molecular-weight polyethylene jacket is an excellent solution to moisture and corrosion problems.

Stalpeth is manufactured in conductor sizes 26 AWG, 24 AWG, 22 AWG and 19 AWG, in cables ranging from 16 to 2121 pairs.

General Cable's Stalpeth is *new*—but Automatic's Supply people can tell you all about it. Just get in touch with your friendly Automatic Electric representative or your nearest A. E. Sales Corporation warehouse.

Automatic's 5 friendly warehouses:

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A member of the General Telephone System—One of America's great communications systems

GENERAL SYSTEM

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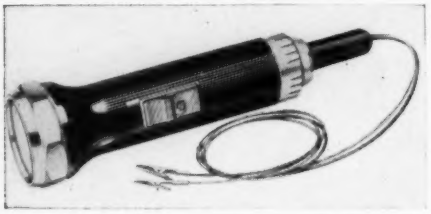
a jack to plug the unit into the flashlight end cap.

Both the jack and the wire leads of the tester are heavily insulated and positive spring grip clips are used to make contact. The flashlight lights when



a continuous circuit is tested and if the circuit is broken or is defective, the flashlight indicates this by not lighting.

When the tester jack is unplugged, the Workman can be used as a regular flashlight.

The Workman flashlight which is a part of the N22T continuity tester kit, is a heavy-duty flashlight that is highly resistant to breakage and rough handling. Unaffected by all common chemicals, the Workman has completely replaceable parts and will withstand great extremes of heat and cold, according to the company.

The N22T is used by electricians, repairmen, mechanics, machinists, maintenance people, contractors, radio and electronics technicians and also household handymen and "do-it-yourselfers."

It can be used for checking wiring, controls, circuits, fuses, grounds, shorts, opens, broken wires, switches, limits, relays, burglar alarms, motors and also for checking and setting contacts. Request NP687.

•

STARTING GUIDE—Tough masonry drilling jobs are made easier by using Tilden Rotary Konkrete Kore drills with the Tilden masonry drill starting guide, which provides a means of precision locating and starting of hole with ease, according to the Tilden Tool Mfg. Co.

The drill guide has guide-holes for drills ¼ inch in diameter through 1¼ inches in diameter, and is simple to use, says the company. Request NP688.

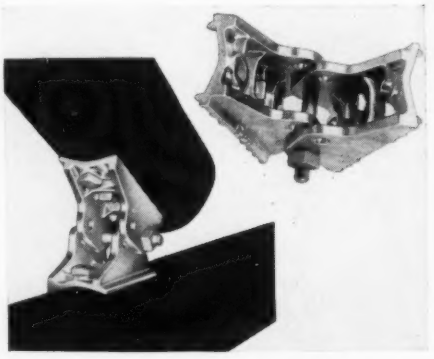
•

READY-TO-INSTALL KITS — Extremely low temperatures create one of the problems confronting suppliers of electrical systems for DEW line and White Alice projects in the Northwest. Hughey & Phillips, Inc., one of the suppliers, engineered and fabricated ready-to-install kits for the Western Electric Co. and the Blaw Knox Co.

Among the systems designed to function at extremely low temperatures are sleet control circuits, obstruction lights, lamp failure alarm systems and emergency telephone circuits. Delivery of these "top of the world" communication components is now reaching completion. Request NP689.

•

SPAR CONNECTORS FOR WOOD POLE STRUCTURES—For greater flexibility in joining various types of wood pole structures, the pole hardware division of Malleable Iron Fittings Co. announces new universal angle spar connectors in two sizes.



The smaller one is a light-duty fitting for joining smaller members and is attached to each round member with a single bolt.

The larger size, of similar design, is attached to round members with a single bolt for medium duty and with two bolts (one through each end) for heavy duty.

Design of the fittings permits attachment to round members at any angle between 0 and 90°. Applications include single-pole, A-frame and H-frame structures, push braces and other special purpose structures.

In both types, all pole-contacting surfaces are curved to fit a wide range of pole diameters, and have teeth and ribs to increase the loads that can be transmitted through the connections.

No gaining is required, and the number of holes drilled is kept at a minimum, the company states. No special tools are needed for installation. All parts except bolts are of what the company describes as strong, tough malleable iron. Request NP690.

•

NOISE MEASURING SET—The Daven Co. announces the production and availability of a new noise measuring set—the type 34-B. It is a portable, self-contained battery-operated instrument designed primarily to measure noise over telephone circuits.

It can also measure acoustic sound levels, function as a transmission measuring set, and as a high gain calibrated

GENERAL MACHINE PRODUCTS COMPANY, INC.
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Aerial Tents
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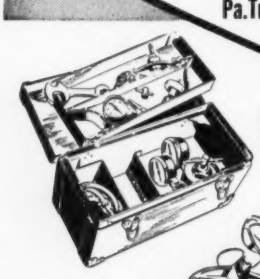
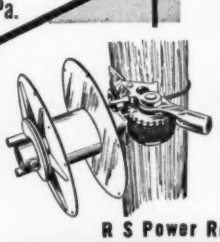
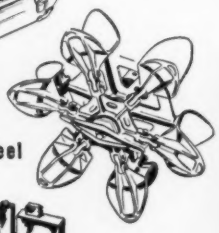
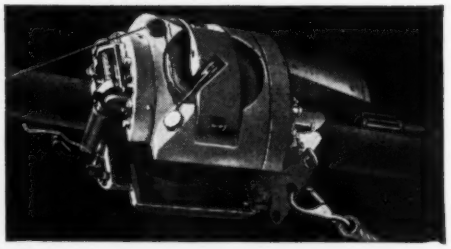
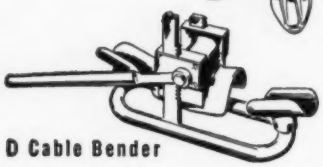

Pressure Testing Kit


R S Power Reel


C R Power Reel




D Cable Bender

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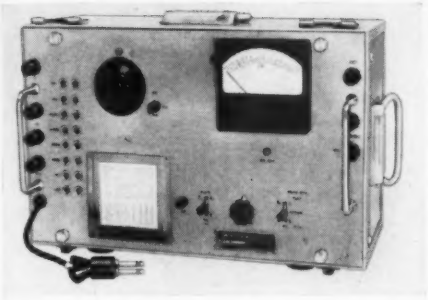


amplifier for audio frequency measurements.

Noise measurements of different frequencies are measured in terms of their interfering effects on speech as heard by the ear. The dynamic characteristics of the meter are such that its response approximates the speed of appreciation of sounds by the ear. Circuits (weighting) which simulate the action of the ear are also incorporated between the "noise input" and the indicating meter.

Three "weighting" networks are available for measurement of acoustic sound levels: "normal" for measurements of moderate sounds about 40 Db above the threshold of hearing—70 Db for fairly loud acoustical sounds, and "flat" for flat audio response.

The complete equipment, including batteries, is contained in a portable case. A removable cover is provided for protection of the front panel. In this cover are located dummy plugs and receiver for monitoring the signal out. Request NP691.

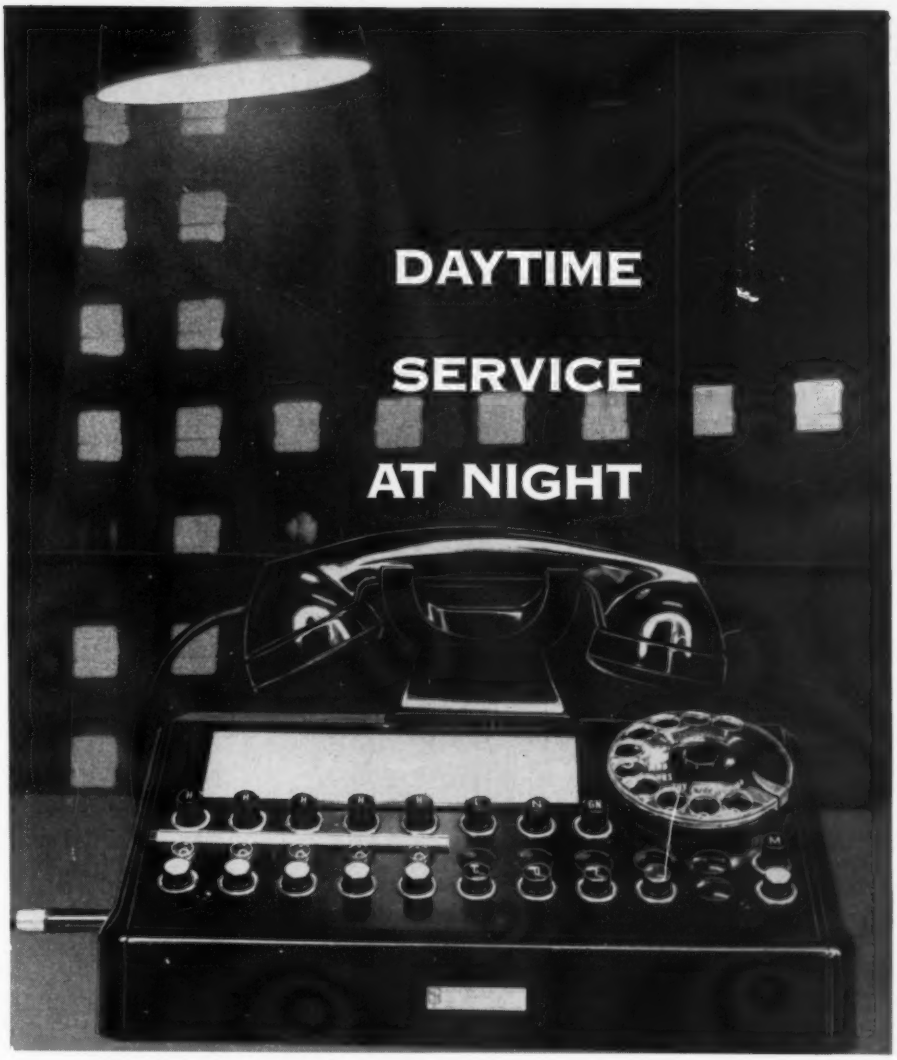
•

JEEP BODIES—Two special bodies have been approved by Willys Motors, Inc., for installation on the new "Forward Control 'Jeep' FC-150."

Either a dump truck body or a service truck body may be installed by

Willys dealers on the FC-150 chassis in lieu of conventional factory installed pick-up or platform stake bodies.

"With approval of these two bodies and a host of special equipment items, the FC-150 can be equipped to do vir-



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Needs no attendant at PBX! Type 30 PBX night key automatically transfers incoming calls to pre-assigned extensions. Inter-office or outgoing calls are dialed direct! These *standard* USI night service features will work overtime for you in selling subscribers on PBX by USI!

FEATURES YOU LIKE!

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Compact rotary and rectangular motion switches with twin bifurcated wipers.

Expands in steps to 15 trunks—100 stations.

Parts delivery overnight to most points.

SUBSCRIBERS LIKE!

Automatic connection of incoming calls to extensions with pushbutton transfer gives daytime service at night.

Key senders pulse automatically on larger systems.

Incoming calls stored and put through automatically.

Write today for our catalogs:

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tually all the jobs other Jeep vehicles perform while at the same time provide its owner with increased carrying capacity on a minimum wheelbase," said C. A. Watson, Willys general sales manager.

Besides the two special bodies, the Willys product engineering department has approved winches, snow plows, angle-dozers and towing equipment for use on the FC-150. These items are available through Willys dealers.

Willys introduced the FC-150 a few months ago as a new addition to its "Jeep" line of utility vehicles. The forward control design allows maximum usage of the vehicle's 81-inch wheelbase for cargo space. Cargo length is 74½ inches or, with tail gate extended, 92 inches.

The dump truck body makes possible the easy dumping of sand, gravel and other cargo on job sites.

The service truck body provides compartments in which to store tools and equipment. These compartments face outward on both sides of the vehicle and leave the truck bed itself open for hauling large pieces of equipment or materials for use on the job site.

Standard pick-up bodies, which are installed at the Willys factory, have full length seats on either side to provide on the job transportation for personnel and still perform regular functions of a truck.

The FC-150 is powered by the Hurricane F-head engine which was developed by Willys. With four-wheel drive, the FC-150 can travel anywhere on or off the road. It may be shifted quickly and easily into conventional two-wheel drive for use on paved streets and highways. Request NP692.

•

EARTH BORING MACHINES—A suspended-type, completely hydraulic earth boring machine which will dig holes 11 to 22 inches in diameter, up to 7 feet deep, and at any angle up to 90 degrees is now being produced by the Highway Trailer Co.

Designated as the Model "B" Digger, the machine can be front or rear mounted on any type of line construction body, with any type of hydraulic derrick. When not in active use, the new unit is "self-storing" on the roof of the truck.

The company states the machine will dig in every type of soil including frost and hard-pan. A drive chain crowd assembly assures rapid and smooth downward digging action. The flight auger, featuring a hole-trimming blade, rapidly cuts the hole to the diameter desired for the pole being set. The machine has two independent hydraulic motors which rotate the auger and power the feed mechanism. Both motors are reversible.

The digger unit is suspended from a derrick swivel. The swivel mounting allows freedom of movement, pivoting to dig holes for anchoring the pole. The Model "B" digger can be positioned so that the derrick is free for pole-setting operations.

On completion of a boring or pole setting operation, the "B" digger hydraulically retracts to carrying position on the roof of the truck, becoming a "self-storing" unit. Request NP693.

•

EXTRA HIGH TENSILE WIRE—Indiana Steel and Wire, Inc. has announced the development and manufacture of a new extra-high-tensile line wire called HTL-195, which it says, provides a combination of telephonic transmission qualities and physical strength never before available in a ferrous conductor.

Spokesmen for the manufacturer stated that the improved voice transmission of HTL-195 for low-cost rural telephone lines and the superior electrical qualities have been proven in five years of laboratory and field tests.

HTL-195 also offers electrical qualities permitting spans of 600 feet in heavy loading districts. Spans of 650 feet in medium loading districts are possible, and in light loading districts, spans are possible to 700 feet. Request NP694.

•

SWITCHBOARD LAMP EXTRACTOR—Announcement of a new switchboard lamp extractor, called No. 553A, has been made by P. K. Neuses, Inc. This

TELEPHONE AND TELEGRAPH EQUIPMENT

Radio Engineering Products is currently producing a number of types of equipment, electrically and mechanically interchangeable with standard Bell System apparatus.

CARRIER-TELEPHONE EQUIPMENT

C5 Carrier-Telephone Terminal (J68756). A kit for adding a fourth toll-grade channel to existing C systems is available. • C1 Carrier-Telephone Repeater (J68757) • 121A C Carrier Line Filter • H Carrier Line Filter (X66217C).

CARRIER-TELEGRAPH EQUIPMENT

40C1 Carrier-Telegraph Channel Terminal (J70047C) • 140A1 Carrier Supply (J70036A1, etc.) • 40AC1 Carrier-Telegraph Terminal.

VOICE-FREQUENCY EQUIPMENT

V1 Telephone Repeater (J68368F) • Power Supply (J68638A1) • V1 Amplifiers (J68635E2 and J68635A2) • V3 Amplifier (J68649A) • V-F Ringers (J68602, etc.) • Four Wire Terminating Set (J68625G1) • 1C Volume Limiter (J68736C).

D-C TELEGRAPH EQUIPMENT

16B1 Telegraph Repeater (J70037B) • 10E1 Telegraph Repeater (J70021A) • 128B2 Teletypewriter Subscriber Set (J70027A).

TEST EQUIPMENT

2A Toll Test Unit (X63699A) • 12B, 13A, 30A (J64030A) and 32A (J64032A) Transmission Measuring Sets • 111A2 Relay Test Panel (J66118E) • 118C2 Telegraph Transmission Measuring Set (J70069K) • 163A2 Test Unit (J70045B) • 163C1 Test Unit (J70045D).

COMPONENTS AND ACCESSORIES

255A and 209FG Polar Relays • Repeating and Retard Coils, several types • 184, 185, 230A and 230B Jack Mountings.

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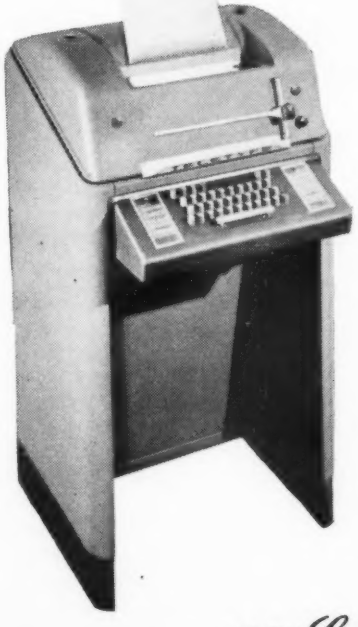
Helping to bring people together

Today, Teletype equipment is helping the communications industry serve more people than ever before. Quick, reliable... Teletype equipment is speeding progress in countless fields.

For example, business men all over the nation "talk" to each other at the touch of a keyboard... press associations send instant news reports to every corner of the land... office automation, production control systems, computer centers, all draw on Teletype equipment's ability to transmit and reproduce text and punched tape.

Because of its versatility, Teletype equipment has become an important source of revenue for many communications companies.

If you would like a copy of our booklet, "The ABC's of Teletype Equipment," write to Teletype Corporation, Dept. T-6, 4100 Fullerton Avenue, Chicago 39, Illinois.



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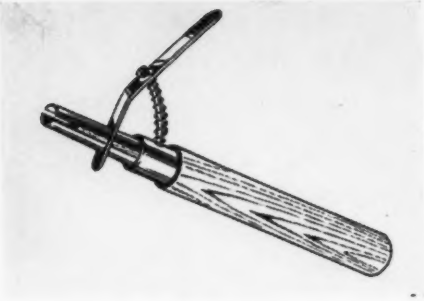


extractor grasps the lamp firmly and evenly for extracting from or pushing into the socket. Request NP695.

•

LINE CONSTRUCTION TRUCK—White Motor Co. has introduced a new truck equipped with a special body design for use in line construction work. The body has a heated crew compartment and extra space for tools, tackle and supplies. Both winch and pole derrick are provided; the one is driven off of the main five speed transmission, while the other takes its power from an auxiliary transmission.

The low step-in height of cab, its roominess and excellent vision make for driver comfort and safety, accommodating larger crew, the company states. The power-tilt-forward feature of the cab provides easy access to radiator, motor, clutch and transmission and results in time saving, lower maintenance cost and improved quality of work. The cab tilts forward in 25 seconds, it is said.

Excellent maneuverability is made possible by the shorter over-all length, wider tread front axle and short turning radius provided in the White 3000 Series, the company claims. Request NP696.

•

ACOUSTICAL WALL BOOTH—Phillip-Brooks Atlanta Co. has announced a new wall telephone booth known as the T-700.

Utilizing recognized sound proofing materials as well as advanced acoustical

design the T-700 actually envelopes the user in silence, the company reports.

The T-700 requires space of only 24 inches x 16 inches x 30 inches. The exterior is of scratch proof wood grain high pressure laminate and the interior is spray painted perforated hard board bonded to honey comb core. Request NP697.

•

METER GUARDS — Meter-Guard is a transparent protective meter cover for Simpson instruments, Models 260, 303, 276, 880. Made of "involvex" this invisible shield slips on over the bake-

lite meter case to constantly protect against dropped tools and other hazards.

Meter-Guard works while the instrument is in use or in transit, thereby preventing costly and annoying damage to meter glass, case and movement. Request NP698.

•

MINIATURE SOLDERING TOOL — The Wasseo Electric Products Corp. has announced a new miniature soldering iron which features high efficiency cooling fins, molded plastic handle and cork grip.

This addition to the Wasseo line of soldering hand-pieces is single tip type and is available in two carbon tip sizes —the 10572 with ⅛ inch tip and the 10573 with 3/16 inch tip.

The tool weighs 2 ounces and its tip reaches into complex cable grouping

well worth investigating

S&G

MODEL A
Air Compressor Dehydrator

Exchange equipment designed to supply chemically dry air for telephone cables, aerial and underground, this unit can supply as many as 30 cables. The unit is equipped with volume recording air meter, high and low pressure alarm switches, humidstat and hour meter.

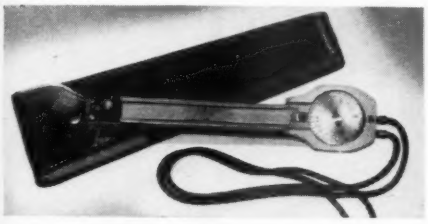
• Completely automatic in operation
• Air Purifier to eliminate oil mist
• Incorporates the latest safety devices

S & G MANUFACTURING CORPORATION
P. O. Box 1309 • New Orleans 10, La. • RAymond 3142

without burning wire insulation. It is equipped with a 5-foot No. 10 extra flexible lead, is designed for use with Wassco 105-B2 500 watt power unit. Request NP699.

•

FIELD RANGE FINDER — An extremely useful instrument for easily and quickly measuring distances from 8 feet to 100 feet—especially distances to inaccessible objects and places is the 6-inch range finder introduced by



Walter S. Chittick Co. It is easily carried in the pocket and speeds work on many projects—erection and maintenance of utility wires, mapping and surveying; or any ground or aerial measurements. It also saves time and money in speeding up outdoor construction and maintenance work, the company states.

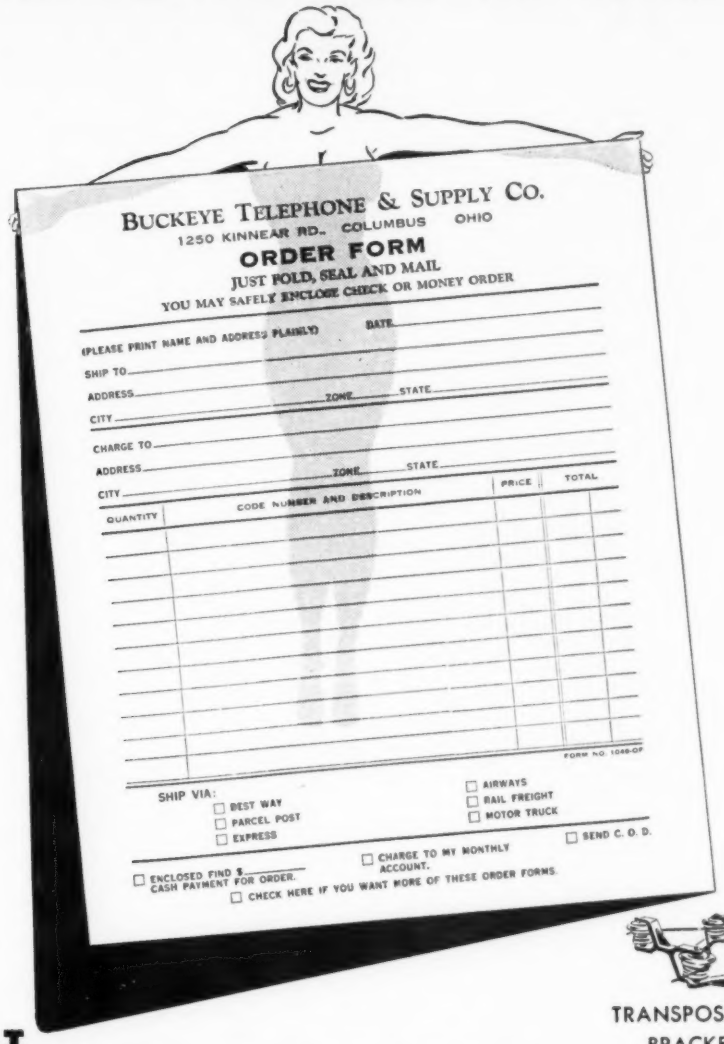
Operation of this range finder is based on coincidence of two images: One image is seen in its natural color and the other image is seen in a strongly contrasted gold color. Upon sighting through the eyepiece both images will be seen. By turning the knob the white image will move either toward or away from the gold image. The knob is turned until the two images coincide perfectly—the image will suddenly appear to be sharp, clear and strongly contrasted. When this occurs the range finder is in perfect alignment. The operator simply reads distance to the object sighted on the dial.

The range finder is sturdily made, will stand long, hard use and is supplied with a top grain, genuine leather carrying case. Request NP700.

•

IMPEDANCE BRIDGE ASSEMBLY—A new universal impedance bridge assembly, Model 291, complete with ac

WHAT DOES AN ORDER FORM COVER?



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CABLE SPLICERS' EQUIPMENT

HERE at Buckeye it covers everything vital to the telephone industry. Everything from pole line hardware to small tools and power equipment are stocked in our warehouse and they are all famous trademarked . . . Cook protective devices, Chance anchors, Klein tools and Nicopress tools . . . to mention a few.

Remember too; this order form covers the dependable efficient service for which Buckeye is known. Every order, regardless of size, receives the same careful consideration and no matter how varied the items may be, you can rely on Buckeye as the centralized supply source to answer your every demand.

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MOTOR GENERATOR SETS

INDOOR and OUTDOOR CABLE

POWER SUPPLY

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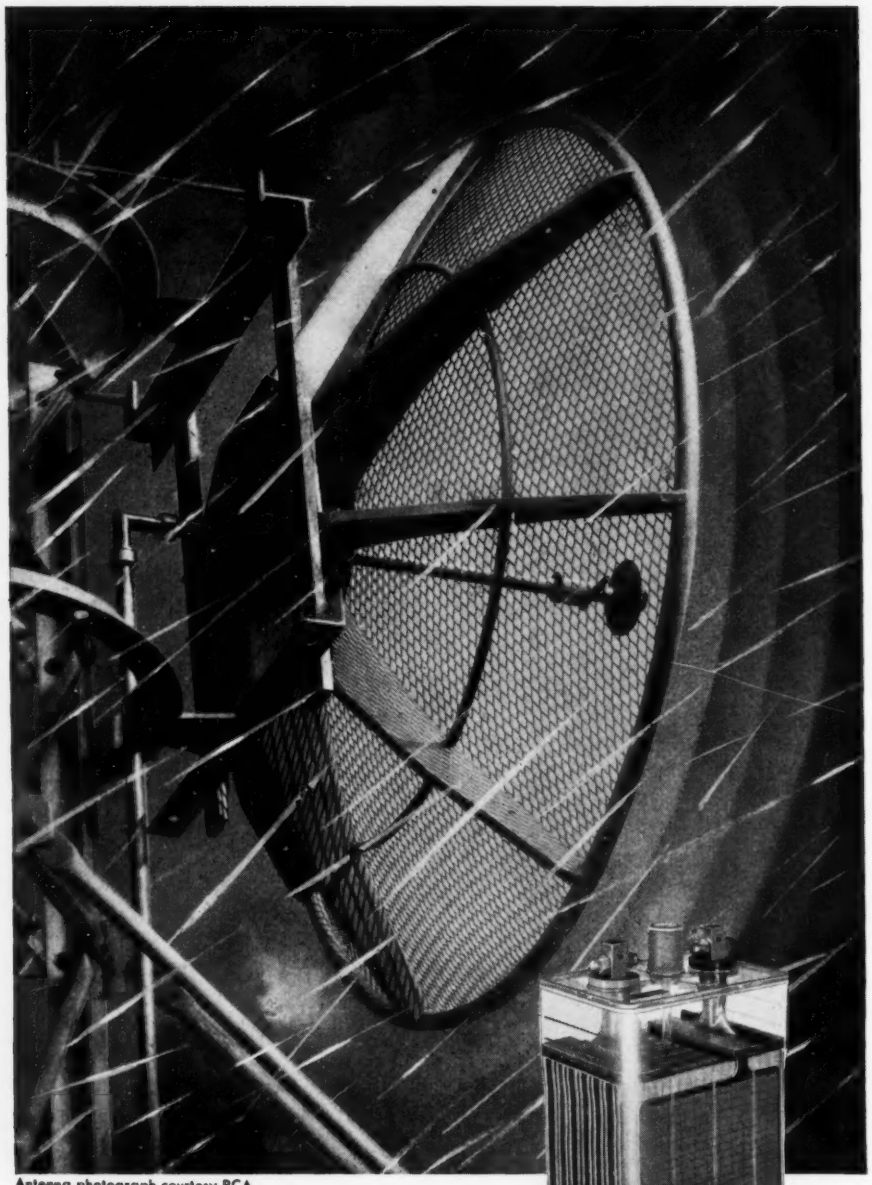

Antenna photograph courtesy RCA

Keep your microwaves on the air!

with C&D Batteries, for standby power

C & D Batteries are always ready to help keep your vital microwave system on the air, regardless of interruptions to normal power supply.

With C & D batteries standing by, you get—

1. An emergency source of power that *always* starts.
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4. Long life—25 years with lead-calcium C & D PlastiCal.®

For complete details on C&D standby power, write for Bulletins T-527/55 and T-528 Rev. 3.

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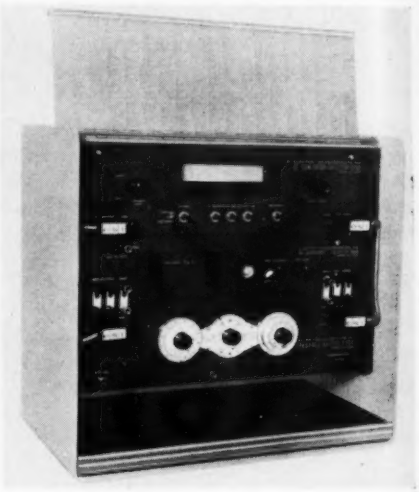
of Conshohocken, Pa. | Attica, Indiana

Industrial Batteries since 1906
SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

and dc generator and detector units, has been announced by Electro-Measurements, Inc.

The instrument has an unusual simplicity of operation with convenient "in-line readout" provided by the exclusive Esi Dekadials and it provides extremely accurate measurements of inductance,



capacitance, resistance, and conductance over a very wide range, the company states.

The instrument is contained in a portable carrying unit. When it is closed, the instrument, including all panel controls, test leads and accessories, is completely protected. The bridge may also be mounted in a standard 19-inch relay rack.

For dc measurements of resistance and conductance, the built-in dc generator, operated from a 115-volt, 50-60 cycle ac power line, can provide either 10 volts or 300 volts to the bridge. During the balancing operation, bridge nulls are detected on a light beam type galvanometer having a deflection sensitivity of 30 millimeters per microampere.

An adjustable 0 to 15 volt power supply, operable from 100 cycles through 10 kilocycles, is available for ac impedance measurements. Frequency selections are made by means of plug-in networks. Visual detection of bridge balance is provided for by use of a dual electronic ray indicator having instantaneous response to a wide range of signal changes. Terminals are provided for accommodating other types of detectors when desired. Ample gain allows null indicator sensitivity to 20 microvolts or less.

The operating ranges and accuracies for this bridge have been improved. They are now 0.1 milliohms to 1.2 megohms, accurate to ± (0.1 per cent); 0.1 micromicromhos to 1.2 mhos, accurate to ± (0.1 per cent); 0.1 micromicrofarad to 1200 microfarads, accurate to ± (0.2 per cent); and 0.1

microhenry to 1200 henrys, accurate to ± (0.3 per cent). The main LRC dial has a scale with 11,000 effective graduations spaced approximately one millimeter apart. Request NP701.

Rip Examiner's Report in Ohio Strike

A veteran trial examiner for the National Labor Relations Board on June 19 was accused by government attorneys of distorting evidence in a report last April in which the examiner recommended dismissal of violence charges against the Communications Workers of America in the strike against Ohio Consolidated Telephone Co. of Portsmouth, O.

Ohio Consolidated charged that the CWA engaged in unfair labor practices through violence in its 229 day strike ended last Feb. 22 in which telephone service was blacked out in Portsmouth for two months.

C. W. Whittemore, an examiner for the NLRB for 20 years, who heard scores of witnesses in a 20-day hearing on the charges, was assailed for his attempt to clear the striking union in a brief filed with the board by Daniel P. Dooley and Clifford L. Hardy, attorneys for the NLRB general counsel.

Dooley and Hardy asked the NLRB to reverse Whittemore's recommendations or order the case reheard before another examiner. They said that Whittemore had taken an "anti-employer" approach in the entire hearing, that his report was biased and replete with half-truths and misrepresentations, and that his conduct in the case was "unwarranted and improper."

"The trial examiner has distorted and ignored evidence in making findings of fact adverse," the NLRB lawyers said. "The trial examiner's adverse credibility findings are without exception based on misstatements of testimony, failure to consider testimoney, and on false findings of fact."

The attorneys criticized a statement in Whittemore's report that "comparative peace existed until the company brought in strangers who stood around job sites without working—an invitation to violence." They called this a fantastic conclusion based on Whittemore's "primitive prejudice," asserting that men brought in by the company were needed to protect workers and valuable property.

The attorneys assailed Whittemore for rejecting evidence that strikers fired into a motel where many company supervisors and workers were staying and for insinuating that com-

ANOTHER
MAJOR IMPROVEMENT
IN GALVANIZED
TELEPHONE WIRE

Crapo
HTL-195

The New LOWER RESISTANCE
Extra-High Tensile Line Wire

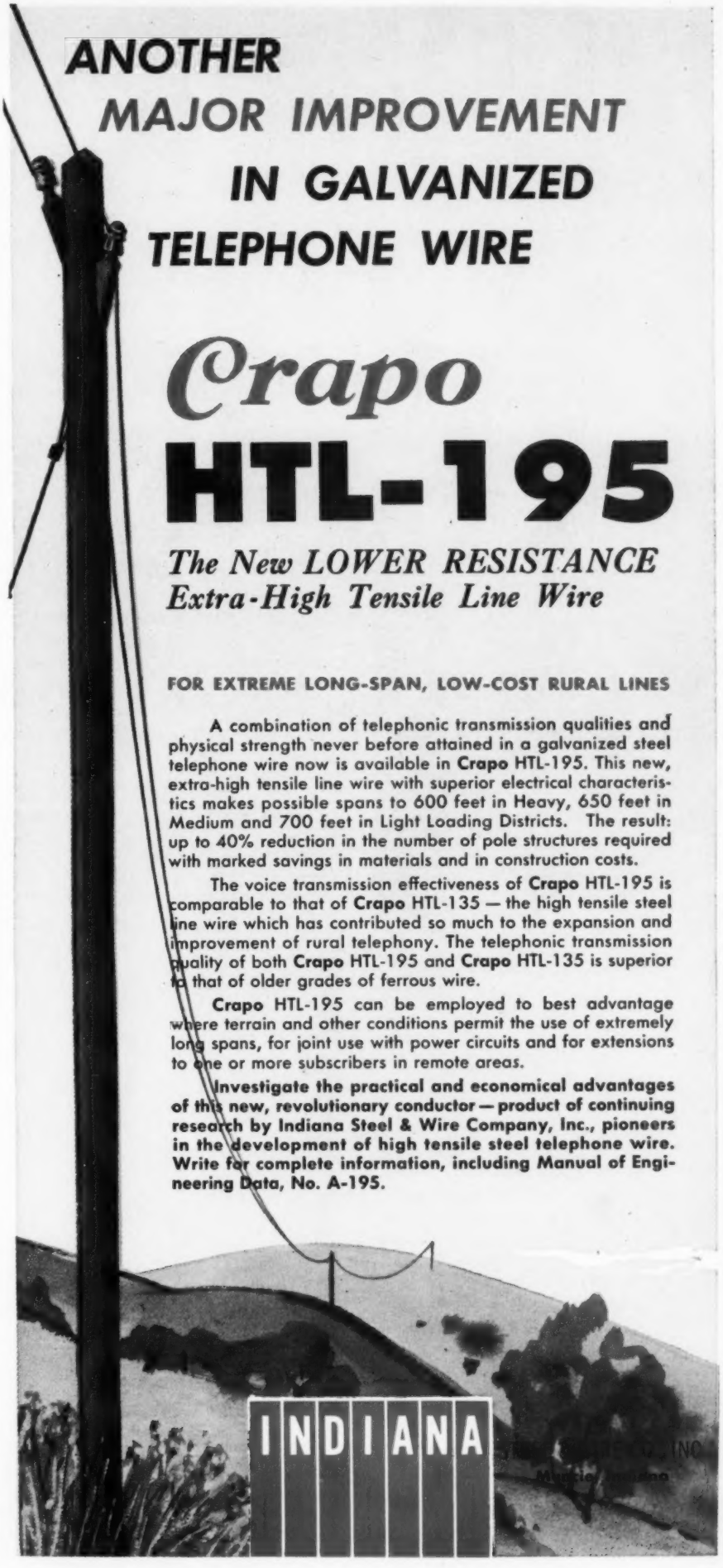
FOR EXTREME LONG-SPAN, LOW-COST RURAL LINES

A combination of telephonic transmission qualities and physical strength never before attained in a galvanized steel telephone wire now is available in **Crapo** HTL-195. This new, extra-high tensile line wire with superior electrical characteristics makes possible spans to 600 feet in Heavy, 650 feet in Medium and 700 feet in Light Loading Districts. The result: up to 40% reduction in the number of pole structures required with marked savings in materials and in construction costs.

The voice transmission effectiveness of **Crapo** HTL-195 is comparable to that of **Crapo** HTL-135 — the high tensile steel line wire which has contributed so much to the expansion and improvement of rural telephony. The telephonic transmission quality of both **Crapo** HTL-195 and **Crapo** HTL-135 is superior to that of older grades of ferrous wire.

Crapo HTL-195 can be employed to best advantage where terrain and other conditions permit the use of extremely long spans, for joint use with power circuits and for extensions to one or more subscribers in remote areas.

Investigate the practical and economical advantages of this new, revolutionary conductor — product of continuing research by Indiana Steel & Wire Company, Inc., pioneers in the development of high tensile steel telephone wire. Write for complete information, including Manual of Engineering Data, No. A-195.



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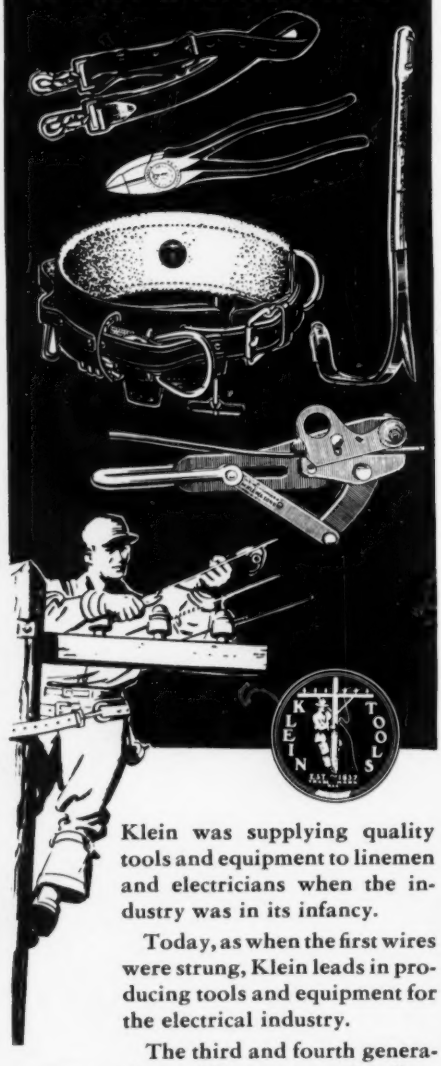
KLEIN

FOR GREATER SAFETY, BETTER PERFORMANCE



Klein was supplying quality tools and equipment to linemen and electricians when the industry was in its infancy.

Today, as when the first wires were strung, Klein leads in producing tools and equipment for the electrical industry.

1857 100 YEARS OF SERVICE 1957

The third and fourth generations of Kleins are still adhering to the quality standards set a century ago. The new Klein plant, equipped with the latest in manufacturing facilities, assures better, safer equipment, wherever power lines or communication lines are strung.

100 years of service to linemen, electricians and industry is back of this new Pocket Tool Guide No. 100. A copy will be sent to you upon request, without obligation.

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pany men may have fired the shots. This, they said, was "a truly irresponsible insertion of gratuitous speculation."

Whittemore said in his report that the company had "invited" disorders by hiring "outsiders" and "strangers," by threatening strikers with physical violence, and by conspiring with hired investigators to engage in violence against certain strike leaders. He said the company had made an illegal effort to defeat employe rights and that its charges against the union were in themselves an attempt to abuse the processes of the board.

The strike was characterized throughout its duration by violence in which club swinging mobs attacked workers and invaded and destroyed company property. Incendiary bombs were tossed and hundreds of cables were slashed.

U. S. Army Needs Science, Engineering Specialists

Specialists in certain critical fields of science and engineering are urgently needed by the United States Army.

Their appointment as Regular Army career officers has been authorized by congressional legislation, within a limitation of 200 outstanding specialists.

President Eisenhower has approved the list, recommended by Secretary of the Army Wilbur M. Brucker, of the critical fields from which they are needed.

Among these fields are physics, nuclear physics, electrical engineering, electronic engineering, electronic data processing, mathematics, mechanical engineering, chemical engineering, chemistry, and communications engineering.

Qualified applicants are not required to have any prior military experience.

Illinois Bell Employe Receives Vail Bronze Medal

An employe of Illinois Bell on June 6 received the Theodore N. Vail bronze medal for saving a life.

Victor T. Ceresa of Oglesby, was presented with the Vail medal and a $250 check at a luncheon held in his honor. Gordon Aller, Chicago, general manager of Illinois Bell, presented the award in a brief ceremony.

Mr. Ceresa, a serviceman, gave first aid to a man who was seriously injured when struck by a wheel which flew off a truck. Mr. Ceresa refused to allow the man to be moved until an ambulance arrived. The doctor credited Mr. Ceresa with saving the man's life.

Edward R. Davenport, equipment manager of the Orange County Telephone Co., Middletown, N. Y., was honored recently by fellow employes and company officials on the completion of 50 years of employment with the company. Left to right: Agnes V. Rowell, secretary of board of directors; Mr. Davenport, Charles C. Chappell, company president, and Lee I. Hunt, assistant general manager. Mr. Davenport was the guest of honor at the monthly luncheon meeting of the company management group at a nearby inn. Mr. Chappell presented a certificate of service, noting that this was the first such 50-year certificate he has signed.

PAGE
LASHING WIRE

You get a neat and long-lasting job every time you use PAGE Stainless Steel Lashing Wire! Ideal for lashing conductor cables (lead or neoprene covered) to a strand messenger by Neale or Western Electric Machine. Coils tailored to fit machine specified.

3 GRADES · EACH IN 2 SIZES (.065 and .045)

Type 430 • for use with galvanized messengers
Type 302 • for use with stainless messengers
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Furnished six coils in cardboard carton (minimum order).

Other fine-quality products • You can depend upon PAGE Strand (Stainless or Galvanized Steel) and PAGE Stainless Dead-End Wire • See your Telephone Supply Distributor, or write our Monessen, Pa., office.

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AMERICAN CHAIN & CABLE

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Ruling Principles of Utility Regulation

RATE OF RETURN

by Ellsworth Nichols

—the book you've been waiting for

500 pages
$15.00

Published by Public Utilities Reports, Inc. and kept up-to-date by periodic pocket supplements.

One of the most important subjects, if not the ***most important subject***, constantly confronting utility managements, regulatory commissions and others concerned, is the ***amount of return*** to be ***allowed public utility companies*** and ***how best*** to ***determine that return.*** After almost four years of research, study, and analysis, Ellsworth Nichols, Editor of PUBLIC UTILITIES REPORTS and author of other publications on regulation, has completed his new volume ***"RATE OF RETURN."***

Throughout the work, emphasis is placed on the ***ruling principles of courts and commissions*** concerning the ***various factors to be considered, the weight to be accorded such factors,*** and ***illustrations*** of the ***application*** of the ***principles discussed.***

The volume contains 25 chapters, each dealing with an important phase of the subject.

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COOL PERFORMER
when the heat's on!

Despite temperature extremes, you can depend on Kennecott lead-alloy sheathed cable to give perfect service! Its exclusive "Young Process" lead sheath and precision-wound tape insulation shrugs off heat damage that would greatly shorten the life of other types of insulation and sheathing. Proof of this is that Kennecott Telephone Cable lines have been giving superior service since 1897. Get full details from the Chase sales office near you.

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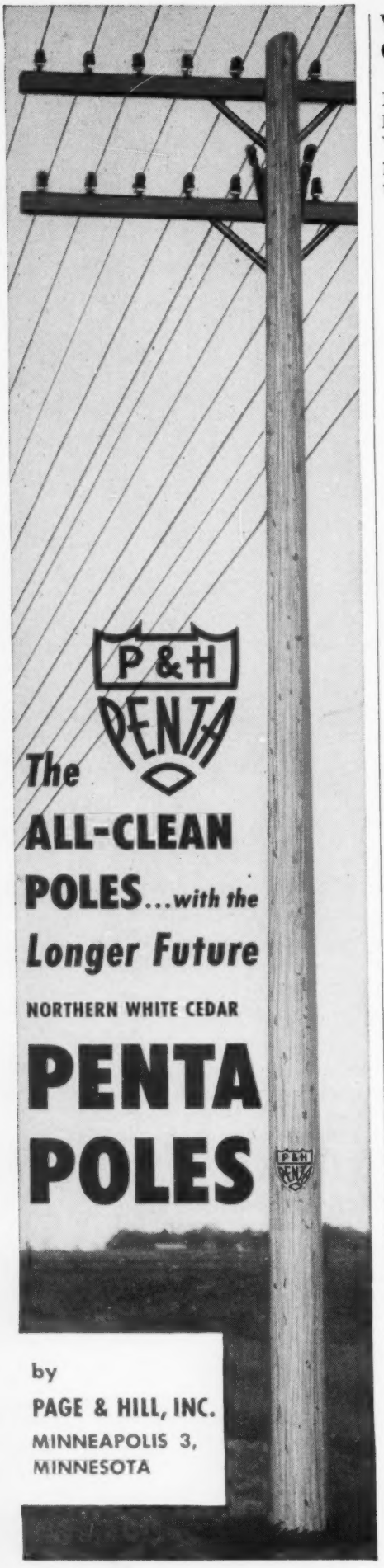

W. S. Sanderson to Direct Gould's Sales Training

The industrial division of Gould-National Batteries, Inc., Trenton, N. J., has announced the appointment of W. S. Sanderson to the newly created position of manager of education and training. In this position, Mr. Sanderson will direct the company's new sales training program designed to coordinate technical presentations and improved application of product information.

W. S. SANDERSON

Mr. Sanderson has been associated previously with the Chrysler Corp., Electric Hose and Rubber Co., and the Indian Motorcycle Co., in personnel and management training.

A Coast Guard veteran, Mr. Sanderson received his bachelor's degree in social sciences and a master's degree in industrial psychology and personnel administration from Springfield College, Springfield, Mass. He is an active member of the American Society of Training Directors and the U. S. Naval Institute.

Western Electric Sponsors Graduate Engineer Program

Western Electric Co., in cooperation with several universities, began a program of graduate education for its engineers on June 17. The cost will be borne entirely by the company.

Timothy E. Shea, vice president in charge of engineering for Western Electric, said the program would be equivalent in cost and administrative effort to the establishment of a school for 1,000 full-time students.

The program will be conducted at specially equipped centers in Chicago, New York and Winston-Salem, N. C.

John H. Bolt, assistant superintendent of engineering training at the company's Hawthorne works, will be in charge of administration at the Chicago center.

The centers opened are at Northwestern University, New York University and Duke University. Other cooperating schools are Illinois Institute of Technology, Cornell University and North Carolina State University.

Each of the centers will include laboratories, libraries, study halls, classrooms and other facilities.

When full operation is attained, the program will include a staff of some 65 full-time instructors and administrators from Western Electric and about an equal number of instructors recruited on a part-time basis from the cooperating universities.

About 2,000 students a year are expected to engage in full-time off-the-job study.

Burfeind Joins Gould as Telephone Consultant

The appointment of Raymond H. Burfeind as special consultant for telephone battery applications has been announced by the industrial division of Gould-National Batteries, Inc., Trenton, N. J. Under Mr. Burfeind's guidance, Gould will expand their customer service program for all telephone battery users.

A retired sales executive of the Automatic Electric Co., Mr. Burfeind joins Gould with a background of over 50 years association with the telephone industry.

Duff-Norton Promotes Krueger to Sales Manager

Promotion of T. W. Krueger to sales manager was announced on June 3 by the Duff-Norton Co., one of the nation's leading producers of industrial jacks and hoists.

Mr. Krueger will be in charge of all sales for the jack and Coffing hoist divisions. The position includes responsibility for foreign sales as well as domestic sales to railroads, the government and distributors.

Mr. Krueger formerly was sales manager of Duff-Norton's jack division, a position he held since January of 1957. He joined the company in 1947 as advertising and sales promotion manager and later served as assistant sales manager.

A Winning Attitude

"Victory is in a sense a contagious thing. In any sort of battle it leaps from platoon to platoon, from flank to center, until the whole front is alight with the determination to win."—DWIGHT D. EISENHOWER, *President, United States of America.*

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FOR RELIABILITY • SERVICE

• NATIONALLY KNOWN TELEPHONE SUPPLIES

Lindsay knows from years of experience that telephone companies cannot compromise on supplier's quality. Reliability, service, and lines—all must be outstanding. This knowledge has played an important part in the Lindsay tradition of leadership.

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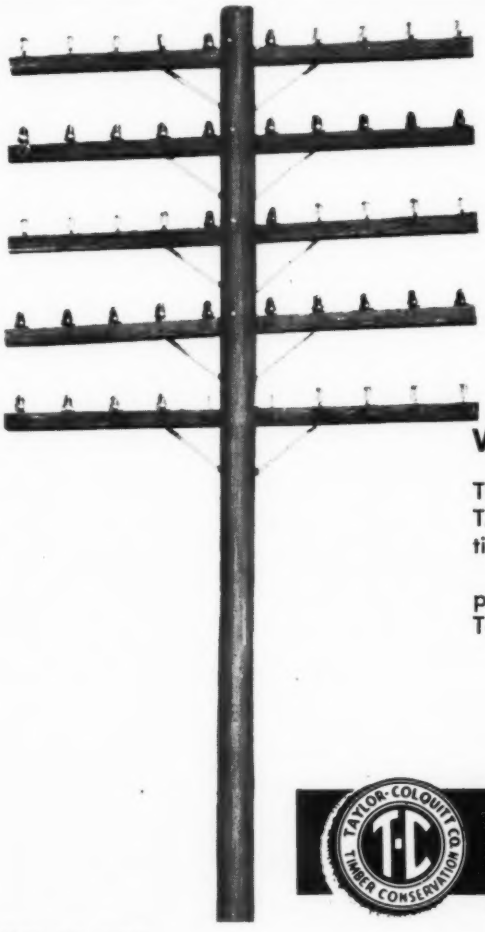

REDUCE POLE REPLACEMENT

WITH T-C PRESSURE-TREATED POLES

TELEPHONE COMPANIES have an enormous stake in wood . . . TAYLOR-COLQUITT helps protect this investment by providing effective preservative treatment for poles.

TAYLOR-COLQUITT assures you year-after-year protection for poles. Make your poles last longer and reduce replacement — specify T-C Pressure-Treated protection.

DISTRIBUTED BY AUTOMATIC ELECTRIC SALES CORP.
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TAYLOR - COLQUITT CO.
SPARTANBURG, SOUTH CAROLINA

PLANTS AT SPARTANBURG, SOUTH CAROLINA AND WILMINGTON, NORTH CAROLINA

XUM

Cuba's first copper fabricating plant was opened in Havana recently by joint owners, Banco de Fomento Agricola e Industrial de Cuba (Banfaic), Holland Insulated Wire & Cable Work, Ltd. (Draka), Amsterdam, and Phelps Dodge Corp., New York. The new company is known as Productos de Cobre de Cuba PhelDrak, S. A. The picture shows some of the machinery used for drawing and extruding various types of copper wire and cable. PhelDrak also makes telephone and signal wires and cables for the communications industry.

Ohio Bell Stenographer Receives Bronze Vail Medal

A bronze Theodore N. Vail Medal and a check for $250 was presented to Faye Stevenor, Akron, O., plant department stenographer, by Personnel Vice President C. K. Milner at a special dinner in her honor, it was reported on June 10.

On Dec. 31, 1956, at 7:10 a.m., Miss Stevenor discovered smoke and fire in the company's stenographic room. She tried to call the fire department but tripped and fell in the attempt—blacking out temporarily. She regained consciousness, called the fire department and then was overcome by smoke. The fire was extinguished in about 20 minutes.

By her initiative, resourcefulness, and interest in protecting the company's property in spite of danger to herself, she succeeded in preventing a very serious fire which would have caused great damage in money and destruction of valuable company records.

Miss Stevenor is the 22nd Ohio Bell woman to receive the Bronze Medal.

Handwriting on the Wall

"Current taxes, from all sources—federal, state, and local—are taking a full third of the income of all citizens to finance government activities. Taxes at present rates from current sources are taking more than 90 per cent of some individual incomes and more than 60 per cent of the net income of most corporations. The present tax rates are approaching confiscation. The economy cannot much longer survive present tax rates on current sources, and it should be understood that tax sources have been exhausted."—HARRY F. BYRD, *U. S. Senator from Virginia.*

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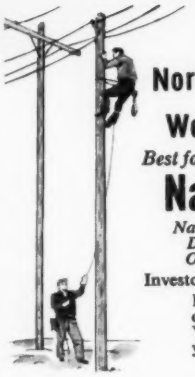

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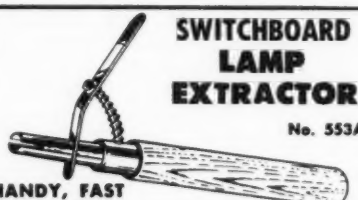

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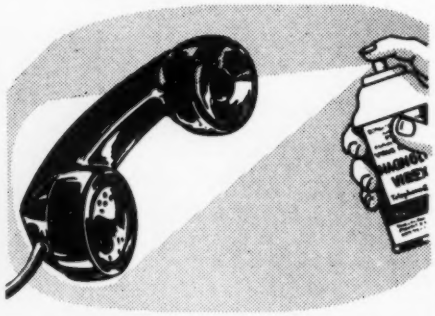

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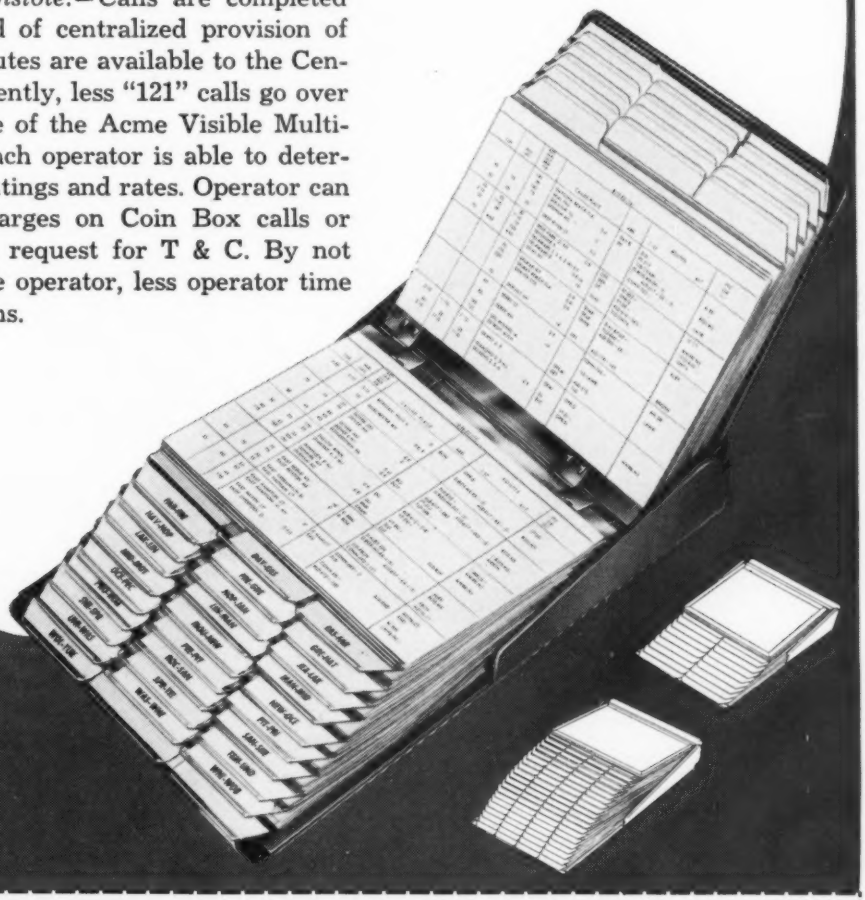

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Please send us illustrated booklet T-6-29-57

☐ #1088 on Acme Switchboard Keyshelf Units ☐ #975 on Acme Flexoline

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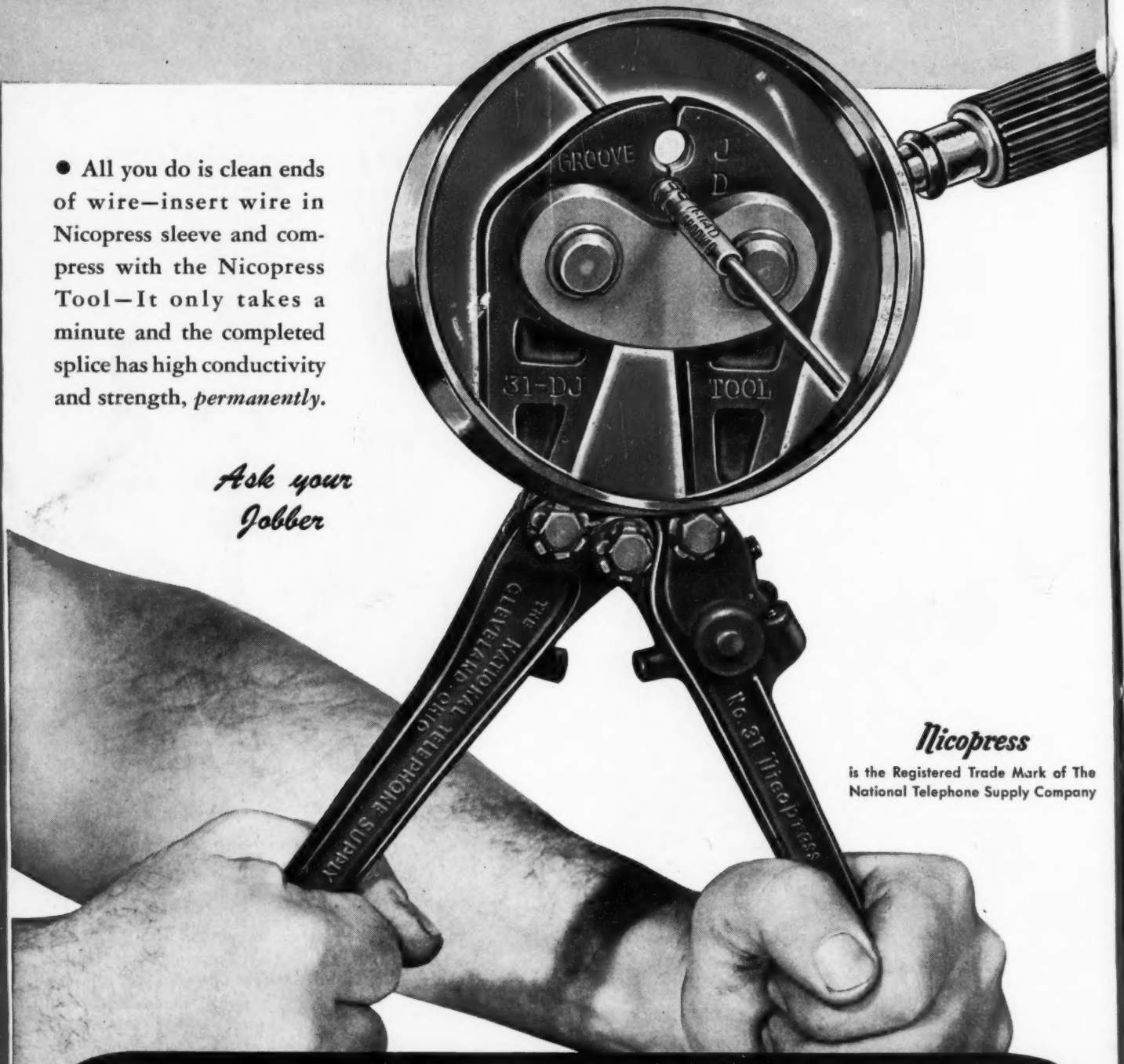

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